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July 6, 2005

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50th ANNIVERSARY 1954-2004

Re: DOJ No. 90-11-2-06089, U.S. v. Buckeye Egg Farm, L.P., et al., United States District Court, Northern District of Ohio, Western Division, Civil Action No. 3:03CV7681 – Dispute Resolution

Dear Ladies and Gentlemen:

This letter is provided on behalf of Ohio Fresh Eggs, LLC. Pursuant to Section XIV of the Dispute Resolution provision of the Consent Decree in the above-referenced matter, Ohio Fresh Eggs has invoked its right to dispute U.S. EPA's demand for stipulated penalties. Ohio Fresh Egg's Statement of Position concerning EPA's demand for stipulated penalties is set forth below.

Background

In a letter dated April 21, 2005, U.S. EPA ("EPA") demanded $533,300 in stipulated penalties from Ohio Fresh Eggs for alleged noncompliance with the Consent Decree. On May 12, 2005, representatives of EPA and Ohio Fresh Eggs met to discuss EPA's demand for stipulated penalties. In a letter dated May 18, 2005, EPA reduced its penalty demand from $533,300 to $490,750. In addition, EPA indicated a willingness to further reduce its penalty demand to $253,750 if Ohio Fresh Eggs began the use of the feed additive by June 1, 2005 at the Croton, Marseilles, and Mt. Victory Facilities and satisfied other related requirements. Thereafter, EPA agreed to toll the deadline for the use of the feed additive and submittal of all related documents. Notwithstanding the tolling of this deadline, Ohio Fresh Eggs began limited use of the feed additive at the Mt. Victory facility, but has not commenced across the board use of the feed additive at its layer facilities due to the prohibitive cost of the feed additive (estimated to be $2.5 million and $2.0 million on annual basis at Northern and Croton Facilities, respectively,) and due to concerns the feed additive's effectiveness (ranges from 15% to 49%) will not enable Ohio Fresh Eggs to achieve a 50% reduction in ammonia emissions at its deep pit layer barns as required by the Consent Decree.

Ohio Fresh Eggs believes EPA's demand for stipulated penalties is unwarranted for the reasons identified below. Ohio Fresh Eggs' Statement of Position, corresponds to the EPA's May 18, 2005 revised Attachment 4, captioned "Ohio Fresh Eggs Stipulated Penalty Worksheet."

Compliance 1 – Complete M5/17 testing at Croton for bird variety higher fat/oil feed.

EPA seeks $16,750 from Ohio Fresh Eggs for its failure to timely complete the Method 5/17 test of the new bird variety and feed at its Croton Facilities. Ohio Fresh Eggs believes the stipulated penalties are unwarranted for the following reasons:

1. Ohio Fresh Eggs contractually obligated its testing contractor, Purdue University and Dr. Al Heber, to timely comply with all testing deadlines set forth in the Consent Decree.

Ohio Fresh Eggs provided the testing contractor with a copy of the Consent Decree and a Summary of the Consent Decree to ensure the testing contractor's compliance with and understanding of the testing deadlines set forth in the Consent Decree. The contract contains multiple references to the importance of Ohio Fresh Eggs' and its contractor's compliance with the Consent Decree.

2. In a letter dated May 3, 2004, Ohio Fresh Eggs timely requested an extension to the testing deadline because of difficulties the testing contractor incurred in preparing for and performing the test. We believe these delays constitute a force majeure event and were attributed to: (a) delays in receiving EPA comments on the PM and Ammonia Emissions Control Plans, the need to revise and resubmit such Plans and the detailed Quality Assurance Project Plan ("QAPP") to address EPA's comments, and obtaining EPA's written approval of such Plans; and (b) difficulties and delays that occurred in finalizing a contract with Purdue, in Purdue's acquisition and refurbishment of required testing equipment and training on its use, and the need to perform quality control testing of the equipment. EPA's approval of such Plans were necessary for Ohio Fresh Eggs to proceed with an authorized test. It should be noted that EPA's approval of these plans was not provided to Ohio Fresh Eggs until June 15, 2004. Ohio Fresh Eggs proceeded at its own risk with the test, without EPA's approval of the PM Control Plan and QAPP, in order to achieve compliance with the Consent Decree.

3. On May 3, 2004, EPA approved Ohio Fresh Eggs' request for an extension of time to complete the test, which test was timely completed during the extension period.

Compliance 2 – Submit proposed changes to PM Plan for Croton Facility.

EPA seeks $139,000 in stipulated penalties for Ohio Fresh Eggs' failure to timely resubmit a revised PM Plan for the Croton Facilities. Ohio Fresh Eggs believes these penalties are unwarranted for the following reason:

1. While the Method 5/17 Test of the new bird variety and feed at the Croton Facilities did not indicate a substantial reduction in particulate emissions, Ohio Fresh Eggs believes the Test may have been biased because of: (a) test duct contamination; (b) inadequate amount of time to allow young birds to settle and age; and (c) inadequate time for sufficient data to be collected to determine the validity of the test data and the effectiveness of the additional 4 percent fat in the poultry feed on particulate emissions. In addition, Ohio Fresh Eggs believes EPA's disapproval was unreasonable because the extent or effectiveness of particular emission reductions required to be achieved is undefined and ambiguous. Ohio Fresh Eggs and Purdue University believe the increased fat content in poultry feed is effective in reducing particulate emissions. Ohio Fresh Eggs believes EPA unreasonably denied Ohio Fresh Eggs' request to proceed with Silsoe testing at the Croton Facilities regarding the effectiveness of the new bird variety and feed in reducing particulate emissions from layer barns. While Ohio Fresh Eggs was evaluating the feasibility of other PM Controls, it proceeded with the Silsoe test at its own risk, and believes useful information regarding layer barn emissions has been obtained.

Compliance 3 – Commence 6-months of testing at Croton for PM to include August, 2004 (within 45-days of EPA approval-begin 01/17/2005).

EPA seeks $83,500 in stipulated penalties from Ohio Fresh Eggs for its failure to commence Silsoe testing for particulate emissions at the Croton Facilities. Ohio Fresh Eggs believes these stipulated penalties are unwarranted for the following reasons:

1. EPA approved Ohio Fresh Eggs' March 15, 2004 PM Control Plan on June 15, 2004, and approved an extension for submission of the Stack Test Report to August 11, 2004, which Report was not disapproved by EPA until September 9, 2004. Ohio Fresh Eggs commenced Silsoe testing at the Croton Facilities on August 10, 2004. The test did not commence on August 1, 2004 due to unavoidable delays caused by the theft of some of Purdue's testing equipment. Ohio Fresh Eggs believes it proceeded timely and in good faith with the Silsoe test at the Croton Facilities notwithstanding EPA's later disapproval of the Stack Test. For reasons discussed earlier, Ohio Fresh Eggs believes EPA's disapproval of the Stack Test was unreasonable and resulted in the rejection of a possible emission control before it had been fully evaluated.

2. Ohio Fresh Eggs timely completed 6-months of Silsoe testing of the Croton Facilities at significant cost, i.e., more than $250,000. Purdue University has been requested to prepare a written report concerning this test which we believe will be useful in better evaluating emissions from layer barns and the potential effectiveness of feed modification in reducing particulate emissions. It appears Silsoe testing has not previously been performed at a belt battery layer barn and this test is expected to show the difference in PM_{10} emissions at belt battery layer barn in comparison to a deep pit barn.

3. Ohio Fresh Eggs did not have an alternative PM Control that was approved by EPA for testing and should not be penalized for not proceeding with testing when feasible PM Controls could not be identified.

Compliance 4 – Submit proposed changes to Ammonia Plan for Mount Victory Facility.

EPA seeks $56,500 in stipulated penalties from Ohio Fresh Eggs for its failure to submit a revised Ammonia Emissions Control Plan for the Mt. Victory Facility. Ohio Fresh Eggs believes the stipulated penalties are unwarranted for the following reason:

1. Ohio Fresh Eggs believes the bench scale test did not have a good simulation in terms of air dilution ratios in the bench scale test chambers to provide an accurate representation of the effectiveness of Ecocure to reduce ammonia emissions. Ohio Fresh Eggs timely submitted, in good faith, Revised Ammonia Control Plans to perform Silsoe testing of Ecocure. Ohio Fresh Eggs submitted Revised Ammonia Control Plans to EPA on July 27, 2004 and August 20, 2004.

Compliance 5 – Commence 6-months of testing at Mount Victory for Ammonia to include August, 2004 (within 60-days of EPA approval-begin 12/13/2004).

EPA seeks $62,500 in stipulated penalties from Ohio Fresh Eggs for its failure to commence Silsoe testing for ammonia emissions at the Mt. Victory facility. Ohio Fresh Eggs believes the penalties are not warranted for the following reasons:

1. Ohio Fresh Eggs did not have an approved ammonia control alternative which could be implemented in a timely manner.

2. Commercially feasible control measures for this type of industry and emissions do not exist and must be customized for this application.

Compliance 6 – Include Croton barns not converted to belt battery in Ammonia Control testing and implementation.

EPA seeks $109,000 in stipulated penalties from Ohio Fresh Eggs for its failure to convert deep pit layer barns to barns with belt battery manure management systems. Ohio Fresh Eggs believes the penalties are not warranted for the following reasons:

1. Despite several requests, EPA has failed to indicate the basis in the Consent Decree for its penalty claim.

2. Ohio Fresh Eggs was not obligated to proceed with belt battery conversion at the Croton layer barns under the Consent Decree, but rather only to comply with the barn conversion schedule set forth under its State permits.

3. The failure to identify an effective ammonia emission control does not trigger an obligation to convert deep pit layer barn to belt battery layer barns. Given the lead time needed to convert a barn to a belt battery manure management system, it is not reasonable to require conversion due to failure to complete ammonia testing or identify an approvable and effective ammonia emission control.

Reporting 1 – Submit preliminary testing results for Mt. Victory particulate impaction system.

EPA seeks $2,000 in stipulated penalties from Ohio Fresh Eggs for its failure to timely submit preliminary test results for the Mt. Victory particulate impaction system. Ohio Fresh Eggs believes these penalties are unwarranted for the following reasons:

1. Ohio Fresh Eggs sought and received appropriate contractual assurances from Purdue University and Dr. Heber that all test reports would be timely submitted to EPA. The testing contractor was provided a copy of the Consent Decree, and a summary of the Consent

Decree obligations, and Ohio Fresh Eggs provided numerous written and verbal reminders to the testing contractor regarding the report submission deadline.

2. The testing contractor had difficulty timely completing the report due to the need to compile and organize testing data.

3. Preliminary raw data was sent to EPA in Purdue's monthly data summaries within the 60 day period for report submission.

Reporting 2 – Submit M5/17 testing results for Croton bird variety higher fat/oil feed.

EPA seeks $12,500 in stipulated penalties from Ohio Fresh Eggs for its failure to timely submit the Method 5/17 test results for the new bird variety and feed at the Croton Facility. Ohio Fresh Eggs believes the penalties are unwarranted for the following reasons:

1. Ohio Fresh Eggs timely requested an extension from EPA to submit the test report.

2. EPA approved an extension of the submission deadline for the report to August 13, 2004, and Ohio Fresh Eggs timely submitted the report to EPA on August 10, 2004.

3. The testing contractor was delayed in submitting the report sooner due to competing time and resource constraints associated with commencing Silsoe testing at the Croton and Mt. Victory Facilities.

4. The testing contractor's need to validate the test data unavoidably delayed completion of the report. The test data did not correlate well with previous test data and differences were being reviewed for logical explanation.

5. The theft of the testing contractor's equipment trailer affected its ability to timely complete the report.

6. Sample desiccation problems affected the time table for completion of the testing and the test report.

7. Ohio Fresh Eggs obtained appropriate contractual assurances from Purdue University and Dr. Heber that all test report submission deadlines would be met, and Ohio Fresh Eggs provided numerous written and verbal reminders to the testing contractor of the report submission deadline.

Reporting 3 – Submit results of bench scale testing under Ammonia Control Plan.

EPA seeks $9,000 in stipulated penalties from Ohio Fresh Eggs for its failure to timely submit bench scale testing results under the Ammonia Control Plan to EPA. Ohio Fresh Eggs believes the penalties are not warranted for the following reasons:

1. Ohio Fresh Eggs was 21 days, and not 25 days, late in submitting the test results to EPA under the timetable set forth in the Consent Decree.

2. Ohio Fresh Eggs received contractual assurances from Purdue University and Dr. Heber that all test results would be timely submitted to EPA. Ohio Fresh Eggs provided a summary of the Consent Decree, the Consent Decree, and numerous written and verbal reminders to the testing contractor regarding the report submission deadline.

3. Ohio Fresh Eggs' testing contractor had difficulty timely completing the test report due to competing demands on available resources to prepare for other tests required under the Consent Decree.

4. Ohio Fresh Eggs' testing contractor was unable to timely complete the test report due to delay in receiving analytical results from the analytical laboratory.

We believe Ohio Fresh Eggs has acted in good faith to diligently comply with the Consent Decree. Ohio Fresh Eggs has expended approximately $750,000 to date to comply with the Consent Decree, and continues to expend considerable resources to identify and evaluate ammonia and particulate emission controls to test and implement. The obligations imposed by this Consent Decree are difficult since Ohio Fresh Eggs is being required to identify and test emission controls that are unproven and untested. Ohio Fresh Eggs believes that it will succeed in identifying workable emission controls, but some understanding and flexibility is needed given the uniqueness of the obligations that Ohio Fresh Eggs is required to satisfy under the Consent Decree.

Should you need any additional information, please contact me.

Very truly yours,

KEATING MUETHING & KLEKAMP PLL

By: Brian M. Babb
Brian M. Babb

Enclosures

cc: Mr. Donald C. Hershey

Dr. Al Heber
Mr. Rick Campbell

1469825.1

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May 20, 2005

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Re: DOJ No. 90-11-2-06089

Via E-Mail
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RE: United States v. Buckeye Egg Farm, L.P., et al. – Civil Action 3:03 CV 7681. Final PM Control Test Report for Mt. Victory Facility

Dear Sir/Madam:

As required under Attachment A of the Consent Decree in the above-referenced matter, I have enclosed a copy of the Final PM Control Test Report for the Ohio Fresh Eggs' Mt. Victory Facility. Also enclosed is Ohio Fresh Eggs' Certification for this Report.

Should you need additional information, please contact me. Thank you for your consideration of this matter.

Very truly yours,

KEATING MUETHING & KLEKAMP PLL

By: Brian Babb
Brian M. Babb

cc: Mr. Donald C. Hershey
Dr. Albert J. Heber
Mr. Richard L. Campbell
Mary T. McAuliffe, Esq. – via e-mail

1449101.1

CERTIFICATION

I certify under penalty of law that this document and any attachments to it were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing and willful submission of a materially false statement.

OHIO FRESH EGGS, LLC

Brian Babb per authorization of Don Hershey 5/20/05

Donald C. Hershey, Manager

1449195.1

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MAY 23 2005
AIR ENFORCEMENT BRANCH
U.S. EPA, REGION 5

Effects of Particulate Impaction System on Emissions from High Rise Layer Barns

Final Report

to

Ohio Fresh Eggs, LLC, Croton, Ohio
11212 Croton Road, Croton, OH 43013

by

Albert J. Heber, Teng T. Lim, Ji-Qin Ni, Pei C. Tao, Claude Diehl, Harrison Sun, Lingying Zhao

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May 20, 2005

AIR EMISSIONS FROM LAYER BARNS IN OHIO

ABSTRACT

Particulate matter emissions rates were measured at two 169,000-hen high-rise layer barns (Barns 1 and 2) at the Mt. Victory Facility owned by Ohio Fresh Eggs. The tests were conducted to evaluate baseline and mitigated emission rates. Using state-of-the-art continuous emission monitoring equipment, data collection began on August 1, 2004 and continued until January 31, 2005. A particulate impaction curtain (PIC) (Big Dutchman, Holland, MI) was installed and tested in Barn 2. The data measured included concentrations of PM_{10} and total suspended particulate (TSP) measured at representative barn exhaust fans. Other measured data included inside and outside temperature and relative humidity, wind speed and direction, bird activity, building static pressure, fan operational status, and barn ventilation rate. TSP samples were collected one to three times per week from one exhaust fan per barn, and mass emissions were evaluated gravimetrically. PM_{10} concentrations were measured continuously using tapered element oscillating microbalance monitors. Average daily uncontrolled mean emission rates from Barns 1 and 2 were 30 and 35 mg of $PM_{10,}$ respectively, per day per hen. The average daily mean emissions of TSP were 281 and 152 mg/s per hen per day in Barns 1 and 2, respectively. Barn 2, with the particulate impaction curtain (PIC), had 47.4% less gross TSP emissions. Based on measurements before and after the PIC, the PM_{10} was reduced by 41%. Issues relating to safety, durability, and maintenance of the PIC are discussed. Modifications and improvements to the PIC are needed before it is practical for use in existing high-rise layer barns.

INTRODUCTION AND OBJECTIVES

Ohio Fresh Eggs, LLC recently acquired commercial egg-laying facilities from Buckeye Egg Farm, L.P. that are located in Croton, Licking County, Ohio ("Croton Facilities"), Harpster, Wyandot County, Ohio ("Marseilles Facilities"), and LaRue, Hardin County, Ohio ("Mt. Victory Facilities").

For six (6) months beginning August 1, 2004, continuous particulate matter (PM) emission measurements were conducted at the Mt. Victory Facility. The descriptions of the production barns and monitoring plans for each site are described in the methods section of this report. An on-farm instrument shelter (OFIS) was used to house instruments to measure air emissions from two mechanically-ventilated layer barns at the Mt Victory Facility. The OFIS was stationed between Barns 1 (B1) and 2 (B2), and housed the gas sampling system (GSS), gas analyzers, environmental instrumentation, a computer, a data acquisition system, TEOM (tapered element oscillating microbalances, Model 1400a Ambient PM_{10} Monitor, Rupprecht & Patashnick, Albany, NY) control units, and supplies needed for the study. The TEOM was used to continuously monitor PM_{10} (10 μm particles and smaller) concentrations in the exhaust airflow and in the ambient air. Total suspended particulate (TSP) was measured periodically. TSP and PM_{10} emission rates were calculated by multiplying concentrations by total barn airflow rates. The emission rate of PM_{10} was calculated on a minute/minute basis.

The objectives of this study were to quantify and characterize baseline PM emissions rates for high-rise laying facilities, and to demonstrate the efficiency of a PM impaction system installed in one of the high-rise laying barns.

Methods

High-Rise Barns

The two caged-hen layer barns at the Mt. Victory, Ohio Facility were built in 1994 along with 12 other barns at the facility. The barns were oriented E-W and spaced 20.7 meters (m) apart (Figure 1). Each barn was 201 m x 20.7 m and housed about 169,000 hens in eight rows of 4-tier crates in the 3.3-m high upper floor. Manure was scraped off boards under the cages into the 3.2-m high first floor twice per day, and was stored for about 12 months. Manure drying on the first floor was enhanced with eighteen, 918 millimeters (mm) diameter (dia) auxiliary circulation fans (Model VG36DM3F, J&D Manufacturing, Eau Claire, WI). The drying fans were arranged in two rows of nine fans each.

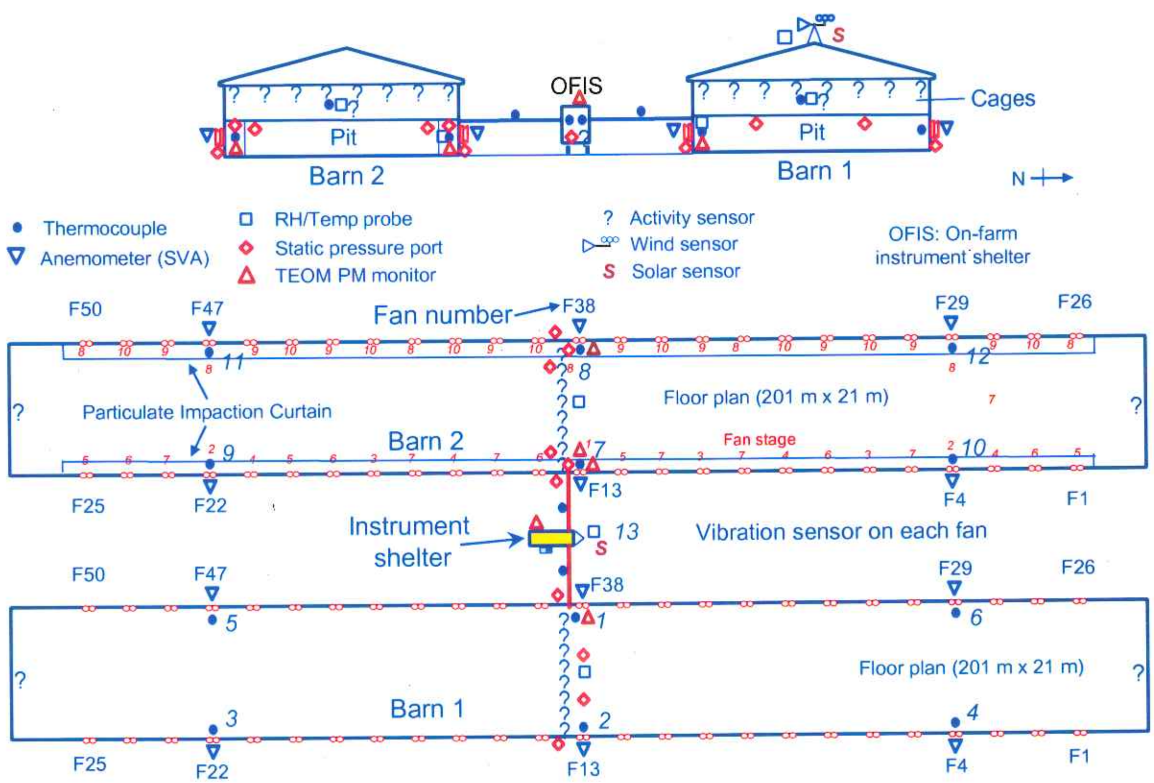

Figure 1. Layout and Cross-Section of High-Rise Layer Barns Showing Monitoring Locations.

Ventilation air entered the second floor of the barn from the attic through temperature-adjusted baffled ceiling air inlets above the cages and exited through continuous manure slots beneath each cage row into the manure collection pit. There were twenty-five 48-in. (122-mm) dia. belted exhaust fans (fans #1-#25) (Advantage Fan Model AT481Z3CP, Aerotech, Lansing, MI) distributed along the east sidewall and 25 fans on the west sidewall (fans #26-#50), Figure 1. The fans were spaced 7.3 m (24 ft.) apart. Each barn was ventilated in 26 rotating stages but modified to 10 fan stages for this monitoring test. The first, second and third stages consisted of 1, 2 and 3 fans each. Eggs were removed by conveyors into the egg processing plant. The cage lights were shut off for several hours each night. Egg production and water and feed consumption were also

recorded automatically, while daily hen mortalities were recorded manually by the collaborating producer.

Particulate Impaction System

The Particulate Impaction System (PIC) (Big Dutchman International, Vechta, Germany) is a physical structure (Figure 2) that resembles a non-rigid ceiling-to-floor filter/curtain combination partition, which was installed parallel to the manure pit sidewall in a deep-pit layer barn. The filter portion of the partition reduces PM emissions by removing airborne particles by impaction before air is exhausted via the ventilation fans. For this test, the PIC was installed along the two sidewalls of Barn 2 (Figure 1). The dimensions of the PIC (upper part of wall partition) were 600 feet (ft) x 6 ft (183 m x 1.8 m) for a nominal total of 3600 ft^2 (335 m^2). The partition was located 30 inches from the sidewall and was connected to the sidewall on each end with wood frame walls. A personnel access door was installed in each of these frame walls. The enclosure was well sealed to force all the fan exhaust air to flow through the PIC.

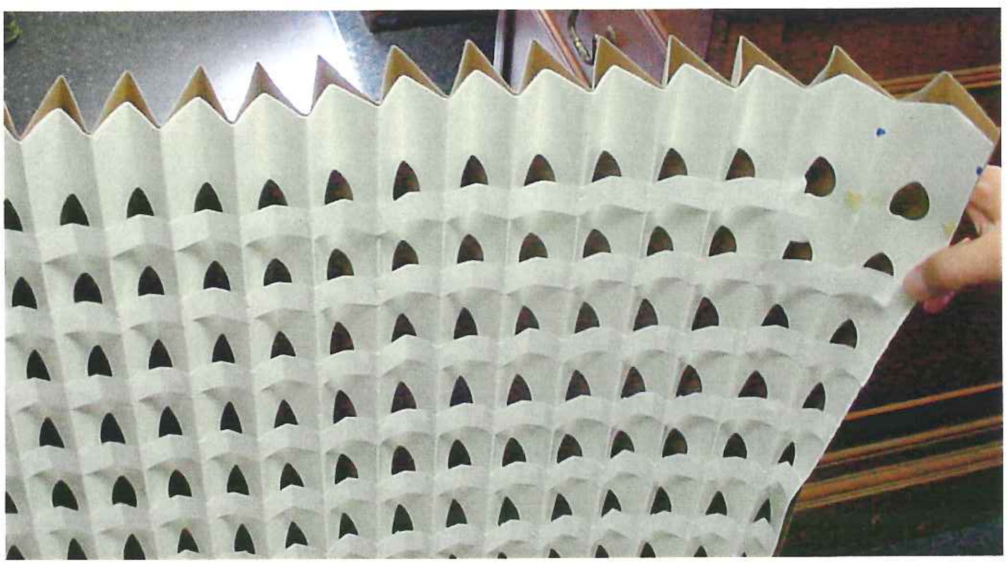

Figure 2. Filter portion of the Particulate Impaction System.

Instrument Shelter

An air-conditioned trailer (7.3 m x 2.3 m x 2.1 m) located between the two barns at Mt. Victory was used to protect instruments and provide storage and on-site laboratory and office space for researchers. The instrument shelter was connected to the two barns using suspended 10 centimeter (cm) ID PVC pipe raceways, which protected signal cables and vacuum hose.

Particulate Matter Concentration

Particulate matter (PM_{10}) concentrations were measured with a continuous ambient PM_{10} monitors (Tapered Element Oscillating Microbalance, TEOM Model 1400a, Rupprecht & Patashnick, Albany, NY) immediately upstream of Fan #38 in Barn 1 and Fan #13 (Barn 2 treated east) and Fan #38 in Barn 2 (B2 treated west). The PIC walkway cramped the location of the TEOM, which required low velocities. However, a low velocity region the size of the TEOM inlet existed directly in front of the exhaust fan and against the curtain. The lower velocity in this

area was due to the convergence and turning of two opposing flow streams into the fan. The TEOM inlet was thus located in this zone.

Another TEOM (Barn 2 untreated) was positioned at the inlet side of PIC, closest to the Fan #13 location to measure the untreated PM_{10} concentration of Barn 2 (Figure 1). Ambient PM_{10} concentration was measured from 12/16/2004 to 1/12/2005 after the Barn 2 treated west TEOM became available since most of the west side fans were not operating at this time. The ambient TEOM sampling inlet was positioned on top of the OFIS.

The TEOM pumps and controllers were stationed in the instrument shelters and provided vacuum to the filters via long vacuum tubes. The TEOM is designated by USEPA as an equivalent method for measuring PM_{10} (EPA Designation No. EQPM-1090-079). The sample stream temperature was maintained at 50°C. The PM concentrations measured by TEOMs were adjusted to report data at one atmosphere and 20°C.

Concentrations of total suspended particulate (TSP) collected at the inlets of the exhaust fans were analyzed gravimetrically using a multipoint sampler that draws 20 liters per minute (L/min) through each of three 37-mm glass fiber filters (loaded in 3-piece open face filter holder) using a critical venturi method. Filters were replaced one to three times weekly with sampling periods of one to two days, depending on measured concentrations. The filters were located at three different heights within the fan inlet (less than 0.5 m from the fan impellers). The filter holders were fitted with isokinetic sampling nozzles that pointed into the exhaust air leaving the barns. The locations of TSP sampling heads were carefully selected by using a portable vane thermoanemometer (Model 451126, Extech, Bohemia, NY) to match the 2 meters per second (m/s) airflow speed required to sample isokinetically.

Pressure Measurement

Barn static pressures were monitored continuously in the barns near the exhaust fans using differential pressure transmitters (Model 2671-100-LB11-9KFN, Setra, Boxborough, MA) with a range of ±100 Pa and an accuracy of ±0.5 Pa. The purpose of differential pressure measurements was to monitor operation of the ventilation system and to aid in the calculation of fan airflow using fan performance curves. A pressure transmitter was used to measure the pressure differential across each building sidewall as fan operating pressure. Two extra pressure transmitters were used to measure pressure drops across the PIC (Figure 1). The pressure sensor was shunted to calibrate zero and compared with an inclined manometer at various span pressures. Atmospheric pressures were monitored with barometric pressure transducers in the TEOMs

Ventilation and Environmental Variables

The operating status (on/off) of each fan stage was monitored via auxiliary contacts of fan motor control relays. Fan airflow capacities were measured in the field with the FANS (fan airflow numeration system), a portable fan tester (Gates et al. 2004) that consisted of multiple traversing propeller anemometers, and was calibrated with an accuracy of 2% at the University of Illinois.

Actual fan performances are typically 5 to 25% less than published fan curves due to dust buildup, belt wear, and shutter degradation, and emissions are overestimated unless fan deratings are known. A FANS was used to test each exhaust fan in October 2004. During these tests, the building static pressure was recorded and the airflow was compared with the ventilation rates estimated from independent tests conducted for the fan model and published by the

manufacturer. The actual fan airflow was estimated from static pressure using a fourth order polynomial equation that was developed for each ventilation fan.

The temperature and humidity of exhaust air along with barometric pressure was needed for accurate volume correction to standard conditions. Copper-constantan thermocouples (Type T) were used to sense temperatures throughout the barns and in the OFIS at various locations: 1) heated raceways, 2) trailer and instrumentation, and 3) exhaust sampling points. The thermocouples were used with 16-bit thermocouple modules (FP-TC-120, National Instruments, Austin, TX). The sensors were calibrated prior to and following the test using a constant-temperature bath.

A relative humidity (RH) and temperature (T) probe (Model HMW61, Vaisala, Woburn, MA) was collocated with each TEOM (Figure 1). Another RH/T probe (Vaisala Model Humitter 50Y) was located in an emptied cage in the middle of each barn. A solar-radiation-shielded RH/T probe (Vaisala Model HMD60YO), a cup anemometer, and wind direction vane were attached to the top of Barn 1.

Hen activity was monitored using a passive infrared motion detection device (Model SRN-2000N, ADI, Inc., Bridgeview, IL) that generated a voltage proportional to movement. The detectors were mounted on the ceiling above each row of cages in both barns and tilted slightly downward to sense hen activity.

Manure sampling and Analysis

Manure of the layer barns was sampled monthly to determine moisture content and pH values, which are important factors affecting PM and NH_3 emissions. Thirty-six (36) surface samples were collected from randomly selected locations in each barn. After collection, the samples were put on ice and delivered to the Purdue manure analysis laboratory for analysis of moisture content and pH.

Data Acquisition and Processing

A custom PC-based data acquisition (DAQ) and control program was developed using LabVIEW for Windows (National Instruments Co., Austin, TX). The program communicated with DAQ hardware (National Instruments Co., Austin, TX), which included several external DAQ modules and internal card (FieldPoint and PCI 6601 DIO, respectively). A separate internal DAQ board (PCIM-DAS1602/16, Measurement Computing Corporation, Middleboro, MA) coupled with an external expansion board (EXP 32, Measurement Computing Corporation) provided 32 more analog input channels. Data acquired by the DAQ system were sampled at a frequency of 1 Hz, then averaged every 15 seconds (s) and 60 seconds (s), and saved into two data files, respectively. The data records included time stamps and gas sampling locations.

Custom data processing software CAPECAB (Calculating Aerial Pollutant Emissions from Confined Animal Buildings) was used to process the 60 second (sec) data set.(Eisentraut et al. 2004a; Eisentraut et al. 2004b) PM concentrations were converted to concentrations at STP (20°C, 1 atm) for calculating emissions. Average daily means (ADM) were calculated using only days with over 70% valid data (complete-data days). ADM for both barns were calculated as weighted means.

Since the PM_{10} concentrations measured by TEOMs were already adjusted to the standard 1 atmospheric pressure and 25°C, the gross PM_{10} emission rate was calculated as:

$$E = Q_o \cdot \frac{P_o}{P'} \cdot C_o^* \cdot \frac{(273+T^*)}{(273+T_o)} \qquad (1)$$

Where:

E	Gross PM_{10} emission rate, $\mu g/s$
Qo	Exhaust airflow rate at To, m^3/s
Po	Pressure of exhaust air, atm
P'	Standard pressure, 1 atm (this disappears from equation since it is equal to 1)
C_o^*	PM concentration recorded by TEOM in exhaust air, $\mu g/m^3$
T*	Temperature basis of TEOM reported concentrations, 25°C
To	Temperature of exhaust air, °C

Results and Discussion

The reported average daily means (ADM) consisted of over 70% valid data (complete-data days) to avoid biasness due to missing data. The overall data completeness of this monitoring test was relatively low because of a series of unfortunate incidents. A cargo trailer containing nearly $20,000 worth of equipment was stolen from the motel parking lot during set up in late July. Due to this theft, the measurement of some variables such as TSP sampling was delayed. A lightning strike on August 28, 2004 damaged part of the data acquisition system (DAQ) and some sensors, and caused a 17-day loss of data. Finally, a main water pipe breakage on January 16, 2005 flooded and damaged a TEOM sensor. Based on the number of complete days, the PM10 emission data were 81% to 83% complete.

The basic statistics of important variables including barn inventory, environment variables, and ADM values are reported in Tables 1-3. The monitoring test started with 172,522 and 163,800 hens and ended with 154,004 and 159,327 hens in Barns 1 and 2, respectively. The ADM bird mass was 1.65 and 1.46 kilograms (kg) for Barns 1 and 2, respectively. Barn 2 started with a new flock of layer hens (W36) that were 16 weeks old while the hens (W98) of Barn 1 were already 93 weeks old, and was 119 weeks of age at the end of the monitoring test on 1/31/05.

The daily mean barn, pit exhaust, and ambient temperatures are presented in Figure 3. The ADM barn temperatures were 23.1, and 23.9°C for Barns 1 and 2, respectively, and were not statistically different based on a paired t-test. However, the temperatures of Barn 1 were maintained generally higher at the beginning of the monitoring test and became generally lower than Barn 2 starting in October. Daily mean ambient temperatures ranged from -15 to 26°C and averaged 9.2°C. The ADM average exhaust temperatures among up to six sampling locations were 20.3 and 20.0°C for Barns 1 and 2, respectively.

The ADM fan differential pressures (averages of west and east sidewall sensors) were -21.5 and -30.9 Pa for Barns 1 and 2, respectively (Figure 4). The daily mean fan pressures ranged from -3.4 to -35.5 Pa and -12.5 to -46.1 Pa for Barns 1 and 2 respectively. The inconsistent pressures of Barn 1 indicated pressure was not well maintained and perhaps not used by the ventilation control system to control the ventilation inlet openings. The lower ADM and range of fan pressure at Barn 2 were due to pressure drop caused by the PIC, which was only about 0.81 m (32 in.) away from the ventilation fans.

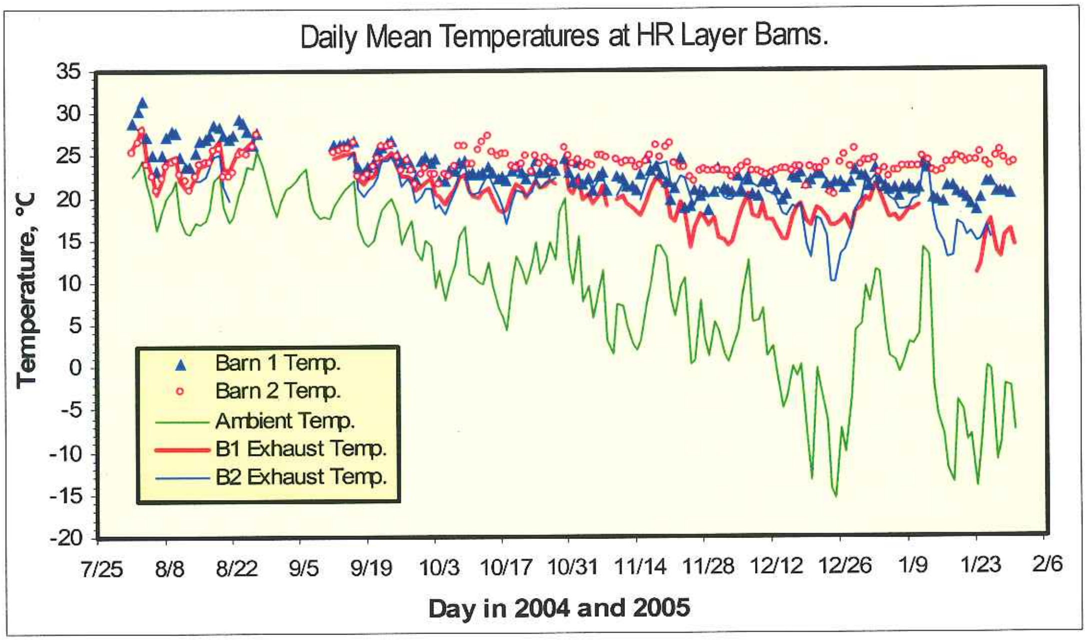

Figure 3. Daily mean temperatures at the high rise layer barns.

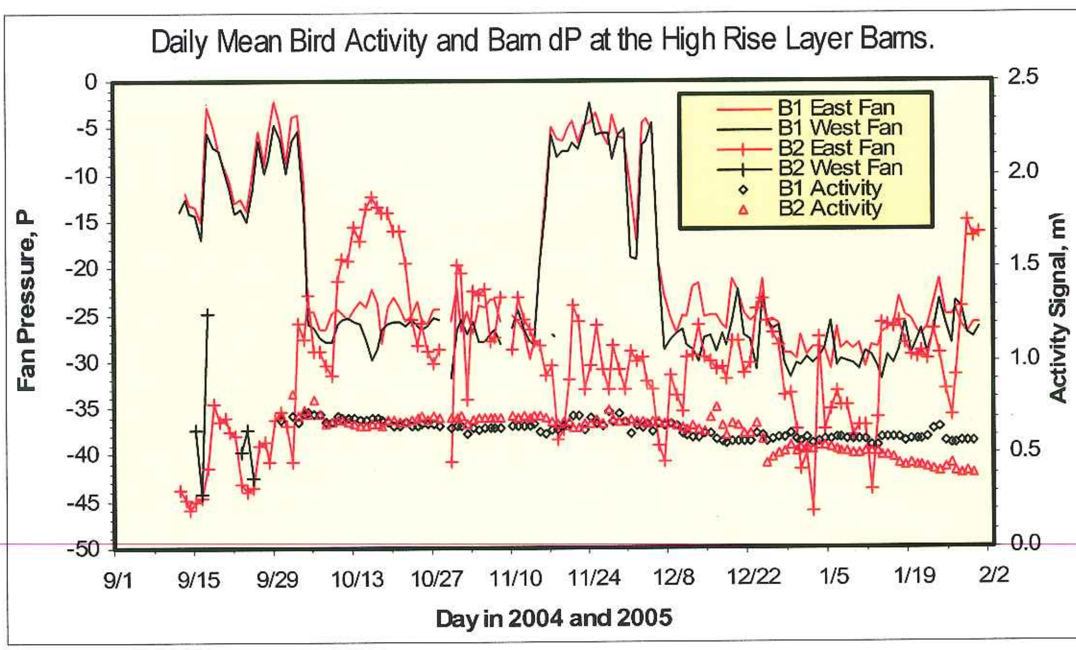

Figure 4. Daily mean bird activity and barn static pressure in the high rise layer barns.

Daily mean exhaust air relative humidity (RH) ranged from 48% to 84% and 49% to 99.8% for Barns 1 and 2, respectively, while the ambient RH ranged from 56% to 98% (Figure 5). The ADM RH was 78% for ambient air, and 66% and 71% for Barns 1 and 2, respectively. Daily mean wind speed ranged from 0.6 to 4.2 m/s. The exhaust RH of both barns did not seem to differ significantly from each other until December when the exhaust RH of Barn 2 appeared to be consistently higher than Barn 1.

The ADM total live mass were 547 and 472 AU for Barns 1 and 2, respectively. The decrease of total body mass in Barn 1 occurred prior to their removal from the barn as spent hens in February, 2005 (Figure 7). On the other hand, Barn 2 started with a new flock of hens which were still growing. The two barns apparently had similar daily mean hen activity until mid December (Figure 4) when Barn 2 decreased in measured activity levels.

Barn ventilation rates were generally higher in warm weather and lower in cold winter (Figure 7). Daily mean airflow ranged from 26 to 350 dsm^3/s in Barn 1 and averaged 112 dsm^3/s. Daily mean airflow ranged from 22 to 329 dsm^3/s in Barn 2 and averaged 117 dsm^3/s.

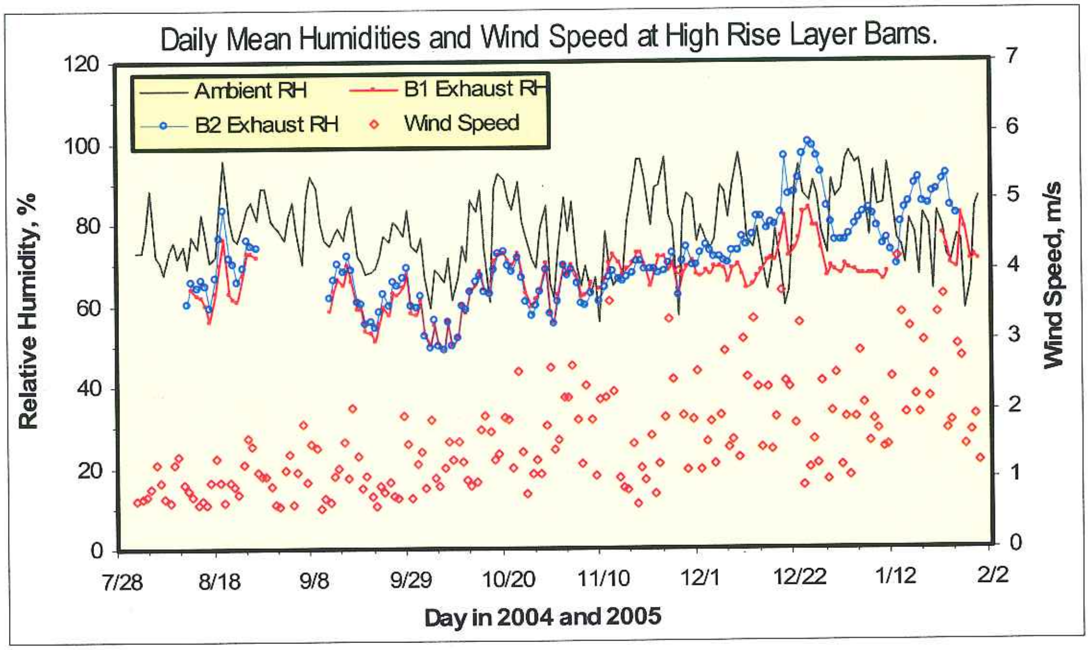

Figure 5. Daily mean humidity and wind speed at the high rise layer barns.

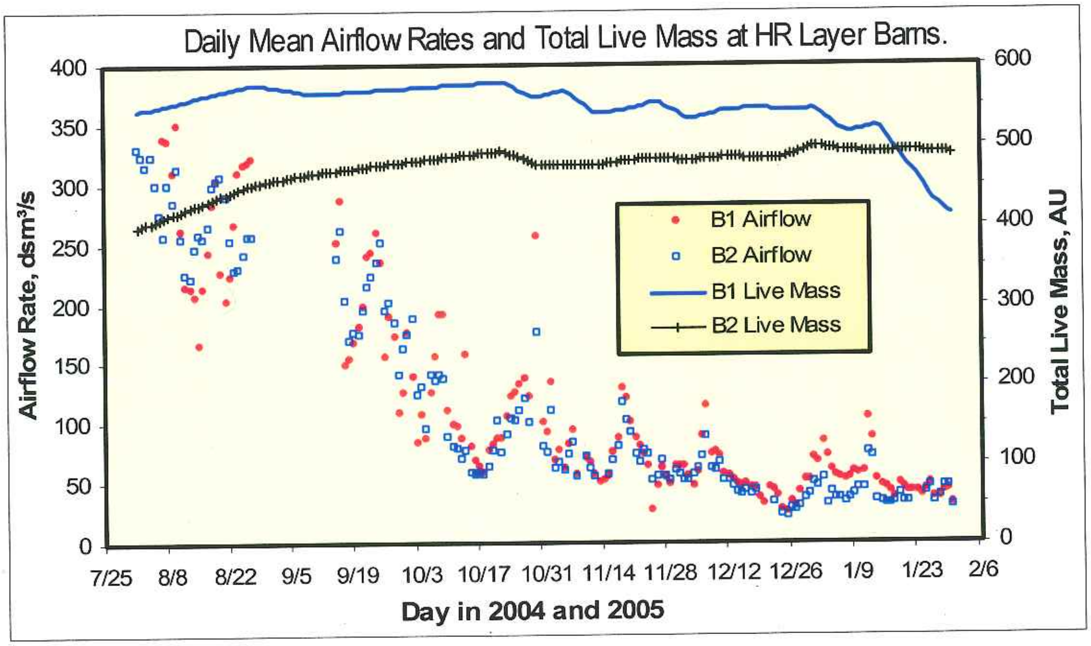

Figure 6. Daily mean airflow rates and total live mass in the high rise layer barns.

Daily mean building ventilation rates were observed to increase with ambient temperatures and the relationships were similar for both barns (Figure 7).

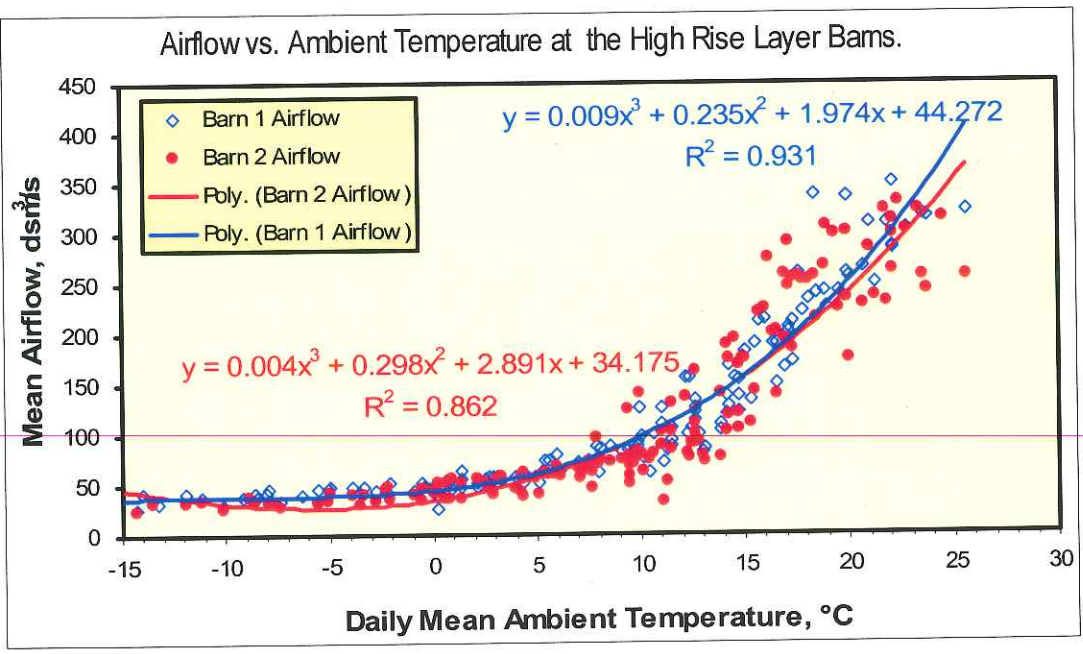

Figure 7. Influence of ambient temperature on barn airflows.

The ADM PM_{10} concentration in the exhaust air of Barn 1 was 565 μg/dsm^3. In Barn 2, the ADM PM_{10} concentration in the center of the pit (B2pit) was 500 μg/dsm^3 whereas the ADM PM_{10} concentrations after the PIC were 432 (n=28 days), and 291 μg/dsm^3 on the west ($B2W_{PIC}$) and east ($B2E_{PIC}$) sides, respectively. Ambient PM_{10} concentration was 58.8 μg/dsm^3 during 28

days in winter (Figure 8). During these 28 days, the ambient PM_{10} concentration was 10.3% of B2 pit concentration during the same period. This percentage is likely to be much higher in warmer weather with a greater number of fans operating. Thus, the gross PM_{10} emission rates presented in this report included a significant fraction of PM_{10} that was reentrained into the barn through the ventilation inlets.

The relatively high PM_{10} concentration of $B2W_{PIC}$ was due to the small number of complete-data days in August and September 2004 when most of the west side fans operated. After late September 2004 they quit operating since they were all assigned to the hot weather ventilation stages. According to egg producers, it takes a new flock about six weeks to adapt to their new cage environment. Until then, their activity increased resulting in higher PM_{10} concentrations and emissions. All three PM_{10} concentration measurements in Barn 2 were higher at the beginning of the monitoring period until mid-September 2004 (Figure 8), which roughly corresponds to the six-week adaptation period.

Comparing only on days when $B2W_{PIC}$ were valid (n=28), the ADM PM_{10} concentrations were 346, 590, and 372 $\mu g/dsm^3$ for $B2W_{PIC}$, B2pit, and $B2E_{PIC}$, respectively. Based on these days, the $B2W_{PIC}$ and $B2E_{PIC}$ PM_{10} concentrations were 33 and 38% lower than B2pit , respectively. A lower efficiency for $B2W_{PIC}$ is expected because there were fewer fans running at the west side, and consequently lower PM impaction velocity. These efficiencies are similar to the mean reductions of 33.7% and 46.0% at low and high air speeds in the preliminary PIC test conducted in June 2004.

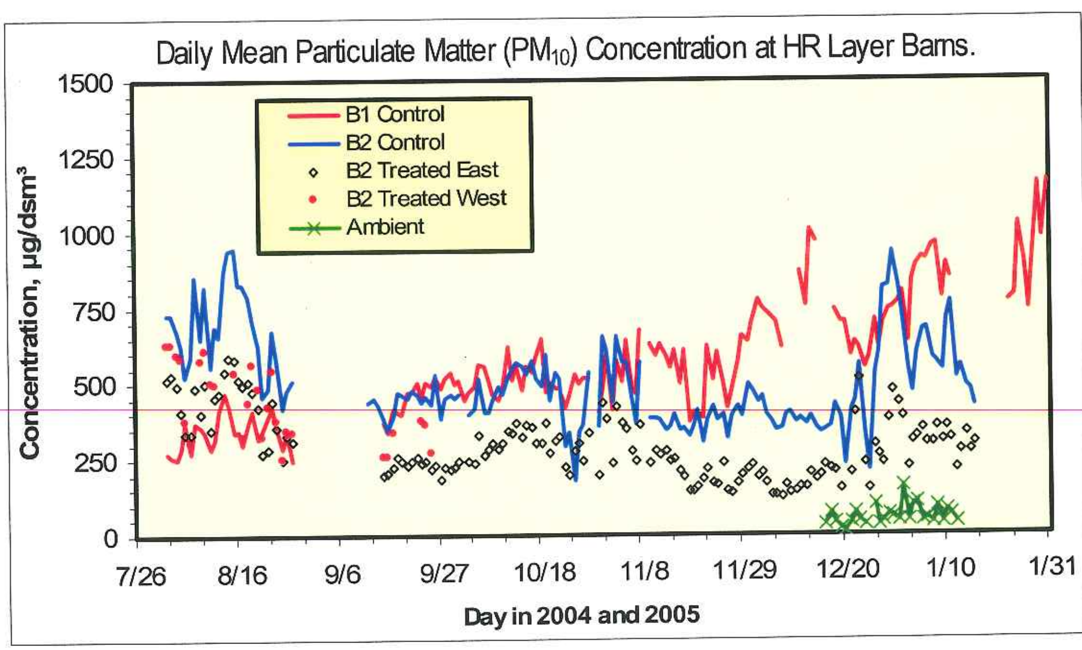

Figure 8. Daily mean particulate matter (PM_{10}) concentration in the high rise layer barns.

Compared with concentrations, the patterns of PM_{10} emission rates appeared to be strongly affected by ventilation rate (Figure 9), which decreased with lower ambient temperatures. This

observation was expected because PM_{10} concentration was relatively unaffected by ambient temperature and emission rate is a product of ventilation rate and concentration.

The ADM untreated PM_{10} emission rates of Barns 1 and 2 were 30 and 35 mg/d-hen, respectively; while the treated PM_{10} emission of Barn 2 was 22 mg/d-hen. Reduction of PM_{10} emission rates was 41% based on measurements before (control) and after (treated) the PIC. Results of t-test analysis (paired two samples for means) indicated that the treated concentration and emission rate of Barn 2 were significantly lower than untreated. Furthermore, the treated daily mean PM_{10} emission rate was consistently lower than untreated throughout the entire monitoring period (Figure 9). There was no significant difference between Barns 1 and 2 untreated gross emission rates, even though the emissions of Barn 2 were significantly higher at the beginning during the six-week bird adaptation period. The measurement of PM_{10} concentration in Barn 2 was discontinued on January 16 after a main water pipe broke and flooded the pit. The water damaged the east TEOM and made the center TEOM inaccessible.

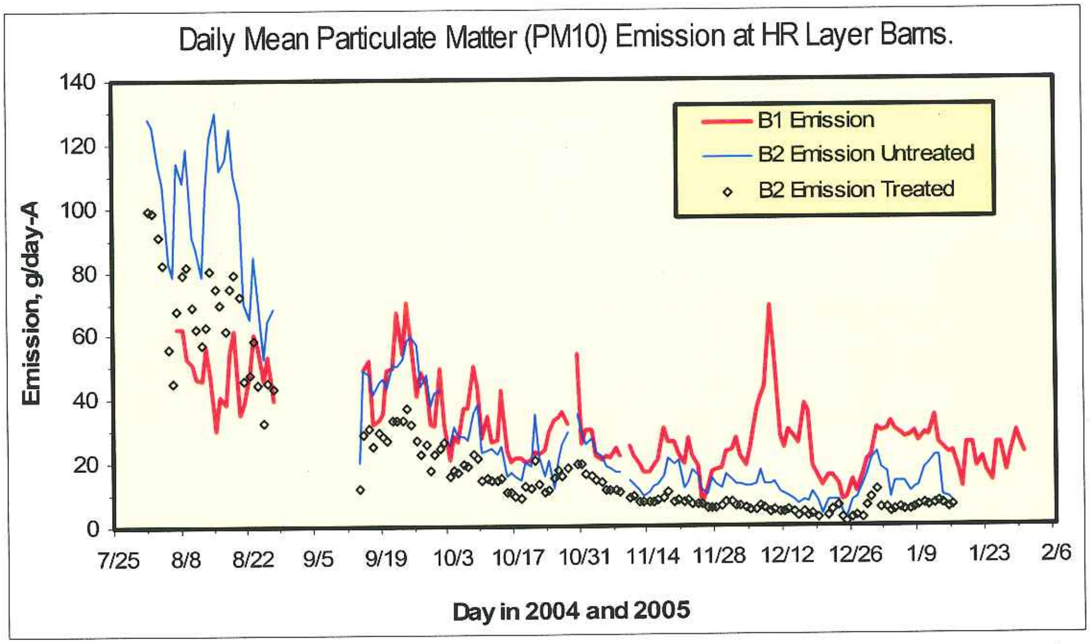

Figure 9. Daily mean particulate matter (PM10) emission rates of the high rise layer barns

Mean TSP concentrations in the exhaust air from twenty-seven, 2-day measurements at Barn 1 was 2,795 $\mu g/dsm^3$ or 4.5 times the mean simultaneously-measured PM_{10} concentration. The mean TSP concentration in the exhaust air of Barn 2 was 1,597 $\mu g/dsm^3$ (n=27) or 6.3 times the mean simultaneously-measured PM_{10} concentration. The mean TSP concentrations and emissions of Barns 1 and 2 are presented in Figure 10. The treated TSP concentration of Barn 2 was 43% lower than the untreated concentration of Barn 1, and the difference was significant ($P<0.05$) based on the t-test.

The mean emissions of TSP were 281±191 and 152±123 mg/s (146±97 and 81±65 mg/d-hen) for Barns 1 and 2, respectively (Tables 4 and 5). The TSP emission rate of Barn 2, with the particulate impaction curtain (PIC), was significantly lower (47.4%, $P<0.05$, t-test) than Barn 1.

Both TSP concentration and emission rate at Barn 2 (with PIC) were consistently lower than Barn 1 throughout the entire monitoring test, except for the last day of the test. Based on the Barn 1 TSP emission rates determined by the TSP sampler, 6.4 million hens would emit 250 tons/year. Based on the Barn 2 TSP emission rate (treated by PIC), 7.7 million hens would emit 250 tons/year. However, the average ambient temperature during the TSP sampling was 8.0°C, which represented cooler weather and lower ventilation. TSP measurements started in September.

Using the TSP/PM_{10} ratios determined during simultaneous measurements and using these ratios to estimate TSP from PM_{10} measurement, it is estimated that it would take 4.2 million and 2.8 million birds respectively to emit 250 tons per year based on Barn 1 and Barn 2 emission measurements.

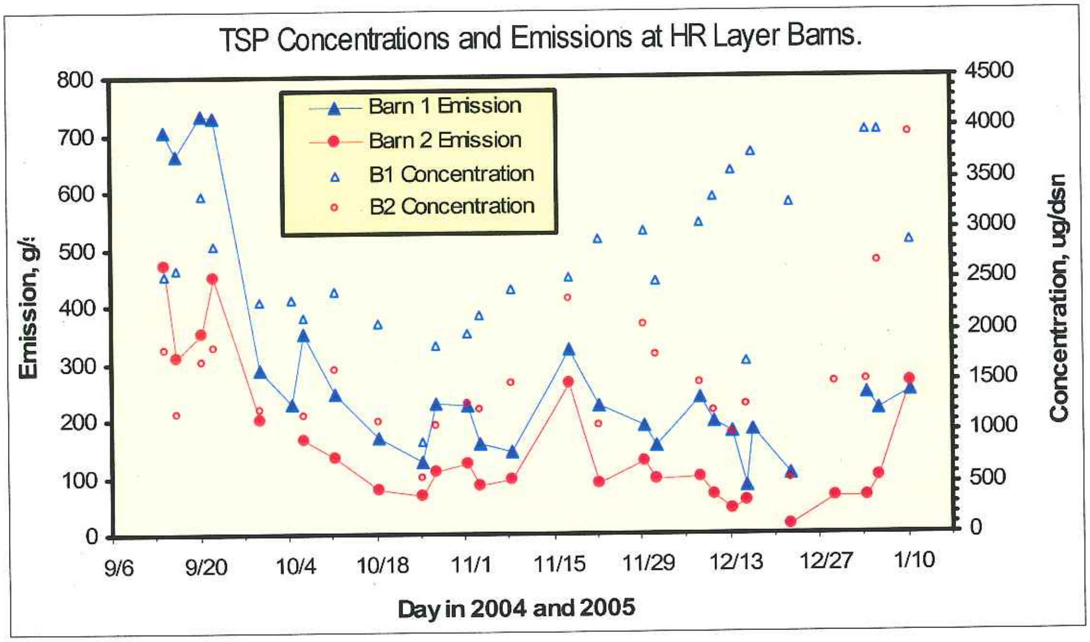

Figure 10. Mean total suspended particles (TSP) concentrations and emissions.

There were five manure sampling events conducted between 9/15/2004 and 01/14/2005. Manure samples were analyzed for pH and moisture content (Table 6). Overall mean pH and moisture contents were 8.4 and 8.1, and 40.3 and 48.1% for Barns 1 and 2, respectively. The manure pH of Barn 1 did not seem to differ throughout the whole test period regardless of the season.

Moisture content of manure samples from both barns appeared to have increased from September. Manure was generally drier in the summer because of the extra drying effect from higher ventilation airflow. Towards the end of the monitoring test, manure in Barn 2 was too wet to walk on as indicated by the very high moisture content on 01/14/2005.

Practical Issues Associated with the Particulate Impaction Curtain

Mechanical Problems

- Immediately after installation, the static pressure created by the fans caused the bottom wood frame member of the PIC, which was hinged at the ceiling, to rotate towards the sidewall until the bottom of the rigid frame was stopped by the sidewall. To prevent this rotation and allow free passage behind the PIC, wooden braces were installed to hold the curtain in the vertical position.
- The plastic skirt at the bottom of the PIC partition was pushed into the narrow walkway by manure accumulation. This narrowed the walkway further and made the plastic skirt more vulnerable to damage.
- The flimsy and fragile PIC required a "hands-off" policy to prevent damage. With minimal effort a person could push their hand against the filter to push it out of the frame. This meant that accidental or incidental contact with the PIC caused damage.
- The accumulation of manure on the bottom plastic skirt made the removal of manure from the pit next to the curtain impossible without damage to the PIC.
- The PIC filter works best in dry air whereas the pit was moist especially in winter when the relative humidity of exhaust rose to 80% and greater. By December, the material of the PIC filter absorbed moisture, which weakened it structurally. Many sections of the PIC were found either seriously damaged or needed to be completely removed (Figure 11).

Figure 11. Sections of Particulate Impaction Curtain were damaged only months after installation.

- The PIC added extra pressure to the existing low-pressure ventilation fans. The higher pressure caused the fans to produce less airflow. Therefore, the Barn 2 controller required more fans to achieve temperature control, especially in summer with higher airflows and greater curtain pressure drops. The data shows that Barn 2 had more fans operating than

Barn 1 (Figure 12). For the entire monitoring period, all 50 ventilation fans operated 18.0% of the time in Barn 2 and only 12.7% in Barn 1. The ADM ventilation rates for the complete-data days were 116 and 109 dsm^3/s for Barns 1 and 2, respectively. However, the ADM operating fan numbers were 17.9 and 19.2 for Barns 1 and 2, respectively. These findings clearly suggest that Barn 2 required 7% more fans to deliver 6.5% less ventilation airflow, thus increasing the operating cost of Barn 2 with the PIC.

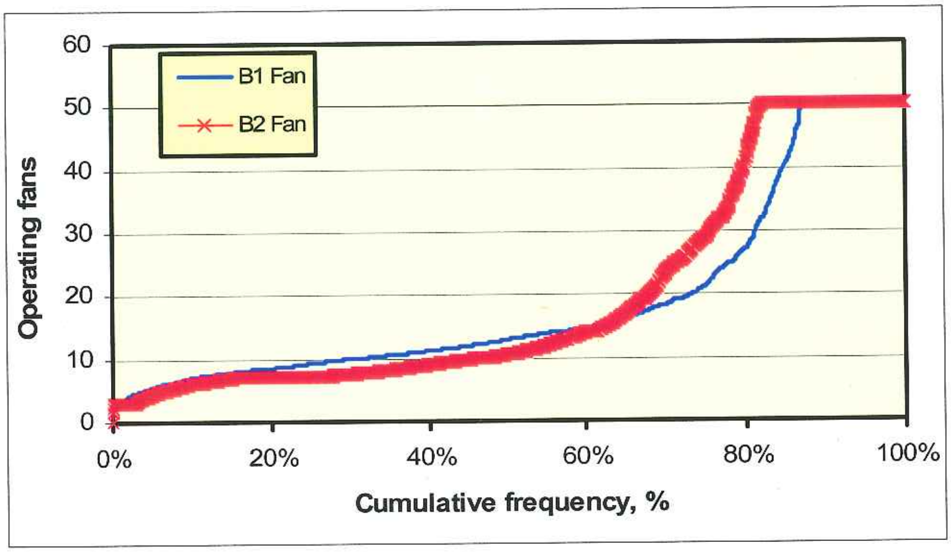

Figure 12. Comparison of the cumulative frequency of operating fans.

- Many horizontal strips of paper became detached from the PIC (Figure 11).
- Removal of a back draft shutter of a fan caused a large jet of air that pushed the PIC backwards and blew out a section of curtain (Figure 11).

Safety Issues

- Collected PM on the curtain upon accidental contact by workers with the PIC may cause serious eye and nose irritation.
- The PIC was installed very close to the sidewalls thus blocking the pit lights. The darkness at night and in cold weather during the day was a safety hazard.
- The walkway was very narrow, especially in the dust sampling area and workers had to avoid tripping over the many braces on the floor.

Maintenance Problems

- The walkway along the PIC was so narrow that it was difficult to access and maintain the instruments inside the walkway.
- Since the PIC had to be located as close to the manure windrow as possible, the access to the front of the PIC for maintenance was limited, especially when the manure became wet.

- The manufacturer had no recommendation on cleaning frequency or even how to clean the PIC. As feathers and dust particles accumulated on the filter surfaces, the air passageways decreased, resulting in higher pressure drop across the curtain (Figure 13). The curtain was cleaned in October 2004 by tapping the frame with a stick along the length of the curtain. This was done with all ventilation fans on the respective sidewall turned off. Dust accumulated on the floor from the cleaning activity. By December, 2004, the dust on the filter had absorbed moisture to make it stick to the filter so that it could not be easily knocked off.
- Chicken feathers tended to lodge themselves in the one inch diameter holes. These feathers would also tend to act as a filter and gather dust particles.
- The PIC was inspected on a daily basis and holes in the PIC were covered with plastic right away. The number of repairs increased significantly in December. This reduced the effective opening area but this was not a problem in the winter when airflow was low. However, many sections of the PIC would have needed to be replaced by spring when airflow increased again. Thus, the life of the PIC was short.
- The PIC material was so delicate that the curtain itself could be easily damaged during cleaning. For example, if worker missed the frame during cleaning, a section of the PIC could easily be torn down.
- The curtain wall contained any condensate buildup on the floor from the uninsulated outside concrete wall.

Figure 13. Inlet side of the Particulate Impaction Curtain was loaded with feathers and dust.

Measurement Difficulties

- The walkway was so narrow that it was very difficult to access and adjust instruments.

- The PM sensor unit for measuring untreated PM concentration could not be positioned close to the PIC but was located between two windrows of manure.
- The TSP sampling nozzle orientation was limited by the walkway. The narrow walkway made the outward airflow velocity profile change more significantly when the neighboring fans turned on and off.
- A broad assumption of uniform mixing was necessary with the selection of only one PM monitoring location for the untreated air and one location for the treated air.
- In the winter, when only one fan draws air through a 600 ft. long curtain, there is likely a large nonuniformity in airflow through the curtain along the full length of the curtain. The nonuniformity decreases as more fans operate. However, it is best to stage the fans so that the operating fans are distributed along the wall as much as possible. For example, operating only three fans (fans 1-3) at the end of the barn would create a lot of nonuniformity whereas a better plan would be to operate fans 4, 13 and 22.

Conclusions

- It would require major structural modification to the bottom skirt of PIC to make it strong enough to resist the manure windrow.
- Since the cellulosic material of PIC was quite fragile and absorbed moisture in the winter which accelerated failure, the curtain could only be used once and would require annual replacement. The PIC could not be used in cold weather.

Infiltration into the PIC Volume

Some leakage probably occurred into the PIC. This PIC leakage is defined as air flowing into the walkway through other openings thus bypassing the filter. In this test, there were some minor leakages that occurred around the personnel door at each end of the walkway and small holes in the framework and the seal between the frame and the ceiling. Some leakage also occurred through a small crack where the ceiling met the wall along the length of the barn. Leakage also occurred through non operating fans as air flowed backwards through cracks in the back draft shutters. The differential pressures driving airflow through each leakage path were as follows:

- PIC framework including doors: Curtain static pressure.
- Ceiling openings including the small gap along the wall: Curtain static pressure and pressure drop between cage area and the pit.
- Fan static pressure. Direct wind impinging on the sidewall would force more fresh air into the PIC. Fan leakage occurs in all barns but the leakage becomes greater with the PIC because the fan static pressure increases due to the curtain pressure drop.

SUMMARY AND CONCLUSIONS

The following air pollutant emission data were obtained from the two layer barns during a 184-day monitoring test.

1. The average ambient temperatures during the tests were 9.2 °C. The mean temperature is within one degree of the annual average temperature. Therefore, the results of this test seem to represent the annual weather conditions fairly well.

2. Average daily mean gross PM_{10} emissions from high rise layer Barns 1 and 2 were 30 and 35 mg/d-hen, respectively.
3. The mean gross TSP concentrations in the exhaust air of Barn 1 from twenty-seven, 2-day measurements was 2,795 $\mu g/dsm^3$ or 4.5 times the PM_{10} concentration measured simultaneously. The mean gross TSP concentrations in the exhaust air of Barn 2 from twenty-seven, 2-day measurements was 1,597 $\mu g/dsm^3$ or 6.3 times the PM_{10} concentration measured simultaneously.
4. The mean emissions of TSP were 281 mg/s and 152 mg/s in Barns 1 and 2, respectively. Barn 2, with the particulate impaction curtain (PIC), had 47.4% less TSP emissions. Based on the Barn 1 TSP emission rate (untreated), 4.2 million birds would generate 250 tons of TSP per year. Barn 2 TSP emissions rate (untreated), 2.8 million birds would generate 250 tons of TSP per year. In Barn 2, with PIC treated emissions, 4.5 million birds would generate 250 tons of TSP per year.
5. Based on measurements before and after the PIC in the high-rise Barn 2, the PM_{10} was reduced by 41%.

REFERENCES

Eisentraut, M. A., Heber, A. J., Lim, T. T., and Hoff, S. J. "CAPECAB Part II: Calculating barn ventilation and emission rates." *A&WMA's 97th Annual Conference & Exhibition*, Indianapolis, Indiana, 10.

Eisentraut, M. A., Heber, A. J., and Ni, J.-Q. "CAPECAB Part I: Processing barn emission data." *A&WMA's 97th Annual Conference & Exhibition*, Indianapolis, Indiana, 18.

Gates, R. S., Casey, K. D., Xin, H., Wheeler, E. E., and Simmons, J. D. (2004). "Fan Assessment Numeration System (FANS) design and calibration specifications." *Trans. of the ASAE* 47(5), 1709-1715.

Table 1. Summary of Daily Means at Barn 1. 8/1/04 to 1/31/05.

Parameter	n	Min	Mean	Max	St. Dev.	95% C.I.
Bird Inventory (n)	184	154,004	165,211	172,522	4959	716
Mean Bird Mass (kg)	184	1.34	1.65	1.73	0.07	0.01
Total Live Mass (AU)	184	412	547	578	33.1	4.8
Temperatures (°C)						
Ambient Air	184	-15.5	9.2	25.6	9.9	1.4
Cages	166	18.5	23.1	31.4	2.6	0.4
Exhaust Air	167	12.3	20.3	27.8	3.2	0.5
Airflow (dsm^3/s)	158	25.9	112	350	83	12.9
Particulate Matter (PM_{10})						
Ambient Concentration (μg/dsm^3)	27	11.3	58.8	160	31.7	12.0
Exhaust Concentration (μg/dsm^3)	147	244	565	1163	195	31.5
Gross Emission (mg/s)	152	1170	5039	11869	2327	370
Gross Emission (kg/day)	152	1.17	5.0	11.9	2.33	0.37
Gross Emission (g/day-AU)	152	2.12	9.2	20.9	4.01	0.64
Gross Emission (mg/day-hen)	152	7.14	30.4	70.2	13.4	2.13
Total Suspended Particulate (TSP)						
Exhaust Concentration (μg/dsm^3)	27	952	2795	4130	745	287
Emission Rate (mg/s)	27	83	281	733	191	74

Table 2. Summary of Daily Means at Barn 2. 8/1/04 to 1/31/05.

Parameter	n	Min	Mean	Max	SD	95% ci
Bird Inventory (n)	184	159,327	161,989	163,800	1098	159
Mean Bird Mass, kg	184	1.21	1.46	1.55	0.08	0.01
Total Live Mass (AU)	184	397	472	497	23.0	3.3
Temperatures (°C)						
Ambient Air	184	-15.5	9.2	25.6	9.9	1.4
Cages	167	20.2	23.9	27.9	1.3	0.2
Exhaust Air (Fan 13)	159	10.0	20.0	28.5	3.6	0.6
Airflow (dsm^3/s)	155	21.7	117	329	90	14.1
Particulate Matter (PM_{10})						
Ambient Conc. (μg/dsm^3)	27	11.3	58.8	160	31.7	11.97
Exh.Conc. (μg/dsm^3), Untreated	151	175	500	946	153	24.40
Exh.Conc. (μg/dsm^3), Treated W	28	251	432	630	126	46.52
Exh.Conc. (μg/dsm^3), Treated E	147	124	291	586	107	17.25
Untreated Emission (mg/s)	149	408	5665	21,206	5452	875
Untreated Emission (kg/d)	149	0.41	5.7	21.2	5.45	0.88
Untreated Emission (g/d-AU)	149	0.84	12.6	52.9	13.2	2.12
Untreated Emission (mg/d-hen)	149	2.53	34.8	130	33.3	5.35
Treated Emission (mg/s)	148	273	3603	16,277	3814	615
Treated Emission (kg/day)	148	0.27	3.6	16.3	3.81	0.61
Treated Emission (g/d-AU)	148	0.56	8.1	41.0	9.29	1.50
Treated Emission (mg/d-hen)	148	1.69	22.1	99.4	23.3	3.75
Total Suspended Particulate (TSP)						
Exh.Conc. (μg/dsm^3)	26	545	1597	4175	729	286
Emission Rate (mg/s)	26	14	152	469	123	48

Table 3 . Daily Means (±SD) of Measured Parameters. 8/1/04 to 1/31/05.

Parameters	Barn 1		Barn 2	
	Average	n	Average	n
Bird Inventory (n)	165,211	184	161,989	184
Total Live Mass (AU)	547	184	472	184
Temperatures (°C)				
Ambient Air	9.17	184	9.17	184
Cages	23.1	166	23.9	167
Exhaust Air	20.3	167	20.0	159
Airflow (dsm^3/s)	112	158	117	155
Particulate Matter (PM_{10})				
Ambient Conc. ($\mu g/m^3$)	58.8	27	58.8	27
Exhaust Conc. ($\mu g/m^3$)	565	147	500	151
Treated Conc. ($\mu g/m^3$)	-	-	291	147
Emission (kg/d)	5.04	152	5.67	149
Emission (g/d-AU)	9.19	152	12.6	149
Emission (mg/d-hen)	30.4	152	34.8	149
Treated Emission (kg/d)	-	-	3.60	148
Treated Emission (g/d-AU)	-	-	8.09	148
Treated Emission (mg/d-hen)	-	-	22.1	148
Particulate Matter (TSP)				
Exhaust Conc. ($\mu g/m^3$)	2795	27	1597	26
Emission (mg/s)	281	27	152	26

Table 4. Mean TSP Concentrations and Emission Rates of Barn 1.

Date	Concentrations		Airflow	Duration	Emissions
	μg/m³	μg/dsm³	m³/s	min	mg/s
9/14/04	2554	2728	276	2557	705
9/16/04	2613	2802	254	1366	664
9/20/04	3333	3537	220	2803	733
9/22/04	2844	3010	257	2864	730
9/29/04	2287	2395	126	1814	288
10/4/04	2305	2381	100	2927	230
10/6/04	2132	2220	164	2821	350
10/11/04	2397	2526	103	2986	247
10/18/04	2068	2183	81	2733	168
10/25/04	908	952	139	2813	126
10/27/04	1851	1940	124	1753	229
11/1/04	1972	2081	114	2846	225
11/3/04	2150	2262	74	2806	158
11/8/04	2415	2487	60	2237	145
11/17/04	2534	2659	127	2901	323
11/22/04	2909	3045	77	2917	225
11/29/04	2990	3104	64	2818	191
12/1/04	2497	2569	62	2820	156
12/8/04	3055	3207	78	2757	238
12/10/04	3317	3487	59	4229	195
12/13/04	3572	3633	50	2904	177
12/15/04	1704	1753	49	2844	83
12/16/04	3747	3872	49	1363	182
12/22/04	3252	3348	33	5613	107
1/3/05	3963	4115	62	2867	246
1/5/05	3972	4130	55	2886	219
1/10/05	2878	3048	86	4356	248
Mean	2675	2795	109	2831	281
St. Dev.	721	745	69	840	191
Count	27	27	27	28	27

Table 5. Mean TSP Concentrations and Emission Rates of Barn 2.

Date	Concentrations		Airflow	Duration	Emissions
	µg/m³	µg/dsm³	m³/s	min	mg/s
9/14/04	1808	1928	259	2110	469
9/16/04	1183	1265	260	1332	308
9/20/04	1706	1805	205	2038	350
9/22/04	1842	1946	243	2508	448
9/29/04	1222	1273	162	2516	198
10/6/04	1169	1215	141	2795	165
10/11/04	1619	1705	83	2979	134
10/18/04	1108	1163	71	2897	79
10/25/04	557	584	119	2879	66
10/27/04	1066	1117	103	1729	110
11/1/04	1278	1350	96	2807	122
11/3/04	1232	1299	67	2821	83
11/8/04	1484	1521	64	1390	95
11/17/04	2315	2448	114	2882	263
11/22/04	1075	1141	81	2939	87
11/29/04	2046	2150	62	2805	127
12/1/04	1765	1844	53.8	2696	95
12/8/04	1480	1571	66.3	2791	98
12/10/04	1198	1272	55.0	4270	66
12/13/04	994	1007	41.8	2908	41
12/15/04	1258	1298	44.9	2762	56
12/22/04	531	545	25.4	5610	14
12/29/04	1476	1534	42.8	2693	63
1/3/05	1504	1569	42.7	2880	64
1/5/05	2669	2788	36.7	2883	98
1/10/05	3931	4175	67	4304	263
Average	1520	1597	100	2816	152
St. Dev.	685	729	70	871	123
Count	26	26	26	26	26

Table 6. Mean Manure Dry Matter Content and pH for the High Rise Barns.

	Barn 1					
	Dry Matter, %			pH		
Date	**Mean**	**n**	**S.D.**	**Mean**	**n**	**S.D.**
9/15/04	70.3	36	19.7	8.6	36	0.5
10/8/04	69.8	36	21.1	8.3	36	0.4
11/11/04	54.3	36	19.0	8.3	36	0.4
12/9/04	55.7	36	15.4	8.4	36	0.2
1/14/05	48.6	36	13.9	8.3	36	0.3
Overall	59.7			8.4		
	Barn 2					
	Dry Matter, %			**pH**		
Date	**Mean**	**n**	**S.D.**	**Mean**	**n**	**S.D.**
9/15/04	57.4	36	25.5	8.3	36	0.5
10/8/04	66.5	35	18.0	8.5	35	0.4
11/11/04	58.4	36	18.2	8.4	36	0.4
12/9/04	44.8	35	14.1	8.0	35	0.5
1/14/05	32.4	36	8.4	7.3	36	0.3
Overall	51.9			8.1		

Appendix

Daily Mean Data

1449829.2

Table 1. Daily means (±SD) of weather data and bird characteristics at Mt. Victory.

August-04													
Day	Weather Variables					Bird Characteristics							
	T, °C	RH, %	Wind Speed, m/s	Wind Direction, °	Bar. P, kPa	Inventory		Mass, kg		Density, kg/m^2		Activity, mV	
						B1	B2	B1	B2	B1	B2	B1	B2
1	22.4±4.1	73.0±21.5	-	-	98.4±0.1	172,498	163,770	1.57	1.21	65.1	47.6	-	-
2	23.3±5.8	73.2±21.3	-	-	98.2±0.2	172,423	163,722	1.58	1.22	65.5	48.0	-	-
3	24.5±4.6	78.7±15.7	-	-	97.9±0.1	172,021	163,670	1.58	1.22	65.3	48.0	-	-
4	21.7±1.5	88.6±5.1	-	-	97.6±0.1	171,631	163,624	1.59	1.23	65.6	48.4	-	-
5	19.3±2.8	72.3±16.2	-	-	98.1±0.2	171,555	163,598	1.59	1.24	65.6	48.8	-	-
6	16.1±4.2	70.4±18.7	-	-	98.5±0.1	171,494	163,568	1.60	1.24	65.9	48.7	-	-
7	18.4±4.3	67.8±19.3	-	-	98.4±0.1	171,437	163,537	1.60	1.25	65.9	49.1	-	-
8	19.9±4.1	73.8±19.2	-	-	98.6±0.1	171,376	163,507	1.61	1.26	66.3	49.5	-	-
9	20.9±5.1	75.6±15.9	-	-	98.4±0.2	171,320	163,473	1.61	1.26	66.3	49.5	-	-
10	22.1±3.1	71.5±16.7	-	-	97.9±0.1	171,251	163,440	1.61	1.27	66.3	49.9	-	-
11	17.6±2.7	74.4±13.4	-	-	97.9±0.1	171,199	163,420	1.62	1.28	66.7	50.3	-	-
12	16.0±3.1	69.0±15.1	-	-	98.0±0.8	171,178	163,403	1.62	1.28	66.6	50.3	-	-
13	15.7±1.9	77.0±9.9	-	-	98.3±0.2	171,167	163,394	1.63	1.29	67.1	50.7	-	-
14	17.1±4.3	74.1±18.5	-	-	98.7±0.1	171,140	163,385	1.63	1.30	67.0	51.0	-	-
15	16.9±3.0	82.2±13.3	-	-	99.0±0.1	171,092	163,368	1.64	1.30	67.4	51.0	-	-
16	17.3±5.4	76.4±22.8	-	-	99.0±0.1	171,044	163,351	1.64	1.31	67.4	51.4	-	-
17	18.8±5.9	70.8±22.8	-	-	98.5±0.2	170,986	163,335	1.64	1.32	67.4	51.8	-	-
18	22.1±3.9	72.0±8.8	-	-	97.8±0.9	170,928	163,323	1.65	1.32	67.8	51.8	-	-
19	22.7±3.2	84.6±11.8	-	-	98.0±0.1	170,869	163,307	1.65	1.33	67.8	52.2	-	-
20	18.9±1.3	95.7±1.8	-	-	98.0±0.2	170,822	163,288	1.66	1.33	68.2	52.2	-	-
21	17.1±2.9	81.0±16.3	-	-	98.1±0.3	170,786	163,267	1.66	1.34	68.1	52.6	-	-
22	17.8±5.9	76.4±19.3	-	-	98.0±2.1	170,732	163,239	1.67	1.35	68.5	53.0	-	-
23	20.6±5.9	75.6±21.3	-	-	98.2±0.1	170,669	163,211	1.67	1.35	68.5	53.0	-	-
24	21.8±4.5	79.9±15.5	-	-	98.3±0.1	170,620	163,191	1.67	1.36	68.5	53.3	-	-
25	23.7±3.0	83.8±9.0	-	-	98.3±0.1	170,572	163,177	1.68	1.37	68.9	53.7	-	-
26	23.5±1.6	85.5±6.6	-	-	98.3±0.1	170,520	163,163	1.68	1.37	68.9	53.7	-	-
27	25.6±3.1	81.1±9.1	-	-	98.3±0.1	170,479	163,150	1.69	1.38	69.2	54.1	-	-
28	23.7±3.0	89.1±9.3	-	-	-	170,439	163,137	1.69	1.38	69.2	54.1	-	-
29	21.8±2.4	88.8±9.0	-	-	-	170,394	163,124	1.69	1.39	69.2	54.5	-	-
30	19.1±2.2	80.8±11.6	-	-	-	170,349	163,108	1.68	1.39	68.8	54.5	-	-
31	17.8±4.6	79.5±17.6	-	-	-	170,302	163,088	1.68	1.39	68.8	54.5	-	-
Mean	20.1	78	-	-	98.2	171,074	163,366	1.64	1.31	67.3	51.3	-	-
Std. Dev.	2.8	7	-	-	0.3	551	187	0.04	0.06	1.3	2.2	-	-
Min	15.7	68	-	-	97.6	170,302	163,088	1.57	1.21	65.1	47.6	-	-
Max	25.6	96	-	-	99.0	172,498	163,770	1.69	1.39	69.2	54.5	-	-

Table 1. Daily means (±SD) of weather data and bird characteristics at Mt. Victory.

September-04

Day	Weather Variables					Bird Characteristics							
	T, °C	RH, %	Wind Speed, m/s	Wind Direction, °	Bar. P, kPa	Inventory		Mass, kg		Density, kg/m^2		Activity, mV	
						B1	B2	B1	B2	B1	B2	B1	B2
1	19.3±5.4	78.7±18.8	-	-	-	170,239	163,071	1.68	1.40	68.7	54.9	-	-
2	21.2±4.8	75.9±17.4	-	-	-	170,174	163,059	1.68	1.40	68.7	54.9	-	-
3	21.3±2.8	81.9±11.8	-	-	-	170,148	163,054	1.68	1.40	68.7	54.9	-	-
4	22.0±3.5	85.2±13.4	-	-	-	170,119	163,035	1.67	1.41	68.3	55.3	-	-
5	22.8±4.6	78.1±16.4	-	-	-	170,056	162,997	1.67	1.41	68.3	55.2	-	-
6	23.5±4.3	70.1±14.5	-	-	-	170,001	162,960	1.67	1.41	68.2	55.2	-	-
7	20.1±0.8	86.3±5.3	-	-	-	169,946	162,921	1.67	1.42	68.2	55.6	-	-
8	18.5±0.5	91.8±3.9	-	-	-	169,886	162,892	1.67	1.42	68.2	55.6	-	-
9	17.6±1.5	88.9±5.9	-	-	-	169,837	162,871	1.66	1.42	67.8	55.6	-	-
10	17.7±4.5	80.3±19.2	-	-	-	169,787	162,857	1.66	1.43	67.7	56.0	-	-
11	17.5±5.6	76.2±20.5	-	-	-	169,731	162,849	1.66	1.43	67.7	56.0	-	-
12	19.0±6.1	74.7±23.5	-	-	98.7±0.1	169,675	162,833	1.66	1.43	67.7	56.0	-	-
13	20.1±5.2	77.1±17.7	-	-	98.8±0.2	169,626	162,819	1.66	1.43	67.7	56.0	-	-
14	20.7±3.5	78.8±10.9	-	-	98.6±0.1	169,579	162,810	1.67	1.44	68.1	56.3	-	-
15	21.2±4.0	75.9±15.0	3.1±0.9	-	98.4±0.2	169,530	162,801	1.67	1.44	68.0	56.3	-	-
16	22.1±3.9	81.9±12.6	2.9±1.2	-	98.1±0.1	169,477	162,792	1.67	1.44	68.0	56.3	-	-
17	16.6±1.9	84.7±7.3	5.5±1.9	316	97.7±2.2	169,418	162,777	1.67	1.44	68.0	56.3	-	-
18	14.7±3.8	72.0±19.4	3.5±1.3	327	98.7±0.3	169,357	162,761	1.67	1.44	68.0	56.3	-	-
19	14.3±5.2	70.7±22.2	2.8±1.3	308	99.3±0.1	169,294	162,746	1.67	1.45	68.0	56.7	-	-
20	15.0±6.5	67.6±26.4	2.2±1.0	225	99.2±0.1	169,234	162,735	1.68	1.45	68.3	56.7	-	-
21	16.9±7.4	68.4±26.2	1.7±0.6	186	99.1±0.1	169,179	162,726	1.68	1.45	68.3	56.7	-	-
22	18.5±7.1	69.0±27.5	1.4±0.5	194	99.1±0.1	169,110	162,716	1.68	1.45	68.3	56.7	-	-
23	19.4±6.6	72.3±22.8	1.9±0.8	199	99.0±0.1	169,038	162,707	1.68	1.45	68.3	56.7	-	-
24	19.9±5.6	77.0±18.4	2.0±0.5	168	98.7±0.1	168,973	162,697	1.68	1.46	68.2	57.1	-	-
25	18.1±2.5	75.6±16.6	2.7±0.8	33	98.7±0.1	168,906	162,686	1.68	1.46	68.2	57.1	-	-
26	14.5±4.3	80.5±17.6	2.1±0.8	339	98.8±0.1	168,838	162,675	1.69	1.46	68.6	57.1	-	-
27	16.4±5.2	79.6±17.2	1.7±0.8	316	98.3±0.2	168,779	162,662	1.69	1.46	68.6	57.1	-	-
28	17.3±2.8	77.2±13.9	4.0±1.7	353	98.0±0.1	168,719	162,649	1.69	1.46	68.5	57.1	-	-
29	13.8±1.9	83.5±7.5	3.5±1.1	12	98.3±0.1	168,638	162,637	1.69	1.47	68.5	57.5	-	-
30	12.7±5.4	74.4±25.4	2.0±0.8	86	98.5±0.1	168,542	162,627	1.69	1.47	68.5	57.5	0.69±0.26	0.72±0.37
Mean	18.4	78	2.7	309	98.6	169,461	162,814	1.67	1.44	68.2	56.2	-	-
Std. Dev.	2.8	6	1.0	85	0.4	498	132	0.01	0.02	0.3	0.8	-	-
Min	12.7	68	1.4	12	97.7	168,542	162,627	1.66	1.40	67.7	54.9	-	-
Max	23.5	92	5.5	353	99.3	170,239	163,071	1.69	1.47	68.7	57.5	-	-

Table 1. Daily means (±SD) of weather data and bird characteristics at Mt. Victory.

October-04

Day	Weather Variables					Bird Characteristics							
	T, °C	RH, %	Wind Speed, m/s	Wind Direction, °	Bar. P, kPa	Inventory		Mass, kg		Density, kg/m^2		Activity, mV	
						B1	B2	B1	B2	B1	B2	B1	B2
1	14.9±7.2	73.2±20.1	2.6±1.2	167	98.4±0.2	168,467	162,612	1.69	1.47	68.4	57.5	0.68±0.25	0.73±0.32
2	14.2±3.9	76.5±16.5	4.0±1.4	89	98.4±0.3	168,412	162,593	1.70	1.47	68.8	57.4	0.71±0.24	0.83±0.28
3	9.3±6.5	66.8±27.2	2.4±1.2	119	98.8±0.3	168,351	162,577	1.70	1.47	68.8	57.4	0.68±0.26	0.71±0.35
4	11.5±4.0	59.4±15.1	4.2±1.4	56	98.5±0.3	168,298	162,563	1.70	1.48	68.8	57.8	0.72±0.25	0.74±0.36
5	7.9±5.3	68.8±22.4	2.0±0.7	39	99.3±0.1	168,246	162,552	1.70	1.48	68.7	57.8	0.73±0.24	0.72±0.36
6	9.9±7.2	67.8±27.0	2.3±1.0	137	99.4±0.1	168,189	162,544	1.70	1.48	68.7	57.8	0.71±0.24	0.80±0.35
7	12.1±7.0	65.5±27.1	2.4±1.2	188	99.4±0.2	168,125	162,537	1.70	1.48	68.7	57.8	0.72±0.23	0.72±0.35
8	15.5±6.9	71.4±16.6	3.4±1.5	163	98.8±0.3	168,055	162,524	1.71	1.48	69.1	57.8	0.68±0.23	0.67±0.34
9	16.5±3.7	61.0±14.3	4.0±1.1	82	98.5±0.1	167,994	162,509	1.71	1.49	69.0	58.2	0.68±0.23	0.68±0.34
10	10.9±5.2	66.6±21.1	2.9±0.8	345	98.8±0.1	167,936	162,497	1.71	1.49	69.0	58.2	0.70±0.23	0.68±0.35
11	10.6±5.2	74.5±20.6	2.4±1.1	321	98.7±0.1	167,872	162,483	1.71	1.49	69.0	58.2	0.70±0.24	0.69±0.34
12	10.1±5.7	70.7±22.8	2.0±1.2	281	97.9±0.4	167,783	162,460	1.71	1.49	69.0	58.2	0.70±0.24	0.67±0.33
13	9.7±0.8	86.1±8.1	1.8±0.7	281	96.9±0.1	167,695	162,437	1.71	1.50	68.9	58.6	0.69±0.23	0.67±0.34
14	12.3±2.2	83.0±12.5	2.9±0.8	112	96.6±0.1	167,625	162,422	1.72	1.50	69.3	58.6	0.69±0.23	0.66±0.34
15	9.5±1.1	88.2±4.6	4.9±1.9	133	96.1±0.2	167,560	162,408	1.72	1.50	69.3	58.6	0.69±0.24	0.65±0.33
16	7.0±0.6	73.5±8.8	7.3±1.9	99	96.7±0.3	167,513	162,395	1.72	1.50	69.2	58.5	0.69±0.24	0.66±0.34
17	6.1±3.4	60.6±16.7	5.2±2.2	99	97.7±0.3	167,456	162,384	1.72	1.50	69.2	58.5	0.70±0.23	0.67±0.33
18	4.2±2.2	88.7±6.1	3.0±1.5	280	97.9±0.3	167,368	162,365	1.72	1.51	69.2	58.9	0.69±0.24	0.66±0.31
19	10.1±2.7	92.2±4.8	2.8±0.6	312	97.7±0.1	167,270	162,340	1.72	1.51	69.1	58.9	0.67±0.23	0.69±0.33
20	13.0±1.7	90.9±5.7	3.0±0.7	328	98.1±0.1	167,154	162,322	1.73	1.51	69.5	58.9	0.66±0.23	0.68±0.35
21	11.5±1.2	85.8±7.3	3.0±0.7	316	98.5±0.1	167,059	162,309	1.73	1.51	69.5	58.9	0.66±0.22	0.68±0.36
22	9.9±4.2	83.3±13.3	2.1±1.0	248	98.5±0.1	167,001	162,297	1.73	1.51	69.4	58.9	0.68±0.22	0.68±0.35
23	12.4±3.3	90.2±4.9	4.2±1.1	200	97.8±0.4	166,927	162,283	1.73	1.51	69.4	58.9	0.66±0.22	0.69±0.34
24	14.7±2.7	80.3±16.6	3.6±1.4	91	97.6±0.3	166,852	162,269	1.72	1.50	69.0	58.5	0.65±0.22	0.69±0.35
25	11.0±6.0	76.6±23.8	1.6±0.7	135	98.3±0.1	166,783	162,251	1.71	1.50	68.5	58.5	0.67±0.23	0.71±0.34
26	12.6±5.9	70.9±22.4	1.7±1.0	220	98.6±0.1	166,712	162,230	1.71	1.49	68.5	58.1	0.67±0.23	0.69±0.35
27	14.7±2.6	69.3±16.0	2.3±0.8	280	98.6±0.1	166,644	162,214	1.70	1.48	68.1	57.7	0.66±0.22	0.70±0.35
28	12.6±4.3	79.1±18.1	1.9±0.6	260	98.7±0.2	166,575	162,198	1.69	1.48	67.7	57.7	0.66±0.22	0.70±0.33
29	18.1±3.7	84.4±6.5	-	144	-	166,487	162,182	1.68	1.47	67.2	57.3	-	-
30	20.0±3.0	65.2±24.5	7.9±3.2	120	97.0±0.2	166,395	162,168	1.68	1.46	67.2	56.9	0.64±0.20	0.70±0.33
31	12.3±3.4	62.0±16.3	5.3±2.4	93	97.9±0.3	166,304	162,148	1.69	1.46	67.5	56.9	0.66±0.22	0.70±0.32
Mean	11.8	75	3.3	136	98.1	167,455	162,389	1.71	1.49	68.8	58.1	0.68	0.70
Std. Dev.	3.3	10	1.5	99	0.8	655	139	0.01	0.01	0.6	0.6	0.02	0.04
Min	4.2	59	1.6	39	96.1	166,304	162,148	1.68	1.46	67.2	56.9	0.64	0.65
Max	20.0	92	7.9	345	99.4	168,467	162,612	1.73	1.51	69.5	58.9	0.73	0.83

Table 1. Daily means (±SD) of weather data and bird characteristics at Mt. Victory.

November-04

Day	Weather Variables					Bird Characteristics							
	T, °C	RH, %	Wind Speed, m/s	Wind Direction, °	Bar. P, kPa	Inventory		Mass, kg		Density, kg/m^2		Activity, mV	
						B1	B2	B1	B2	B1	B2	B1	B2
1	9.8±3.8	73.7±12.5	3.0±1.5	239	98.3±0.2	166,224	162,130	1.69	1.46	67.5	56.9	0.66±0.22	0.70±0.33
2	15.3±3.1	86.4±10.0	3.4±1.5	109	97.9±0.3	166,143	162,112	1.69	1.46	67.5	56.9	0.61±0.21	0.67±0.33
3	7.7±1.7	78.2±9.5	-	288	98.8±0.3	166,046	162,093	1.70	1.46	67.8	56.9	0.65±0.23	0.69±0.35
4	9.5±2.3	85.5±7.9	-	119	97.3±0.4	165,969	162,077	1.70	1.46	67.8	56.9	0.63±0.22	0.70±0.34
5	5.8±2.3	69.1±12.7	5.1±1.3	87	98.1±0.1	165,894	162,055	1.71	1.46	68.2	56.9	0.65±0.22	0.70±0.34
6	9.1±5.1	64.7±11.6	5.2±1.7	117	97.6±0.1	165,799	162,035	1.70	1.46	67.7	56.9	0.64±0.21	0.70±0.35
7	11.4±4.1	69.5±15.7	4.7±1.3	78	97.8±0.4	165,693	162,023	1.69	1.46	67.3	56.9	0.64±0.21	0.70±0.33
8	3.1±2.5	62.7±16.6	3.4±0.9	41	99.2±0.3	165,608	162,005	1.68	1.46	66.9	56.8	0.65±0.22	0.70±0.32
9	1.4±3.0	66.5±15.3	-	-	-	165,531	161,986	1.67	1.46	66.4	56.8	-	-
10	7.4±6.2	55.6±14.8	4.4±1.2	159	99.0±0.2	165,444	161,966	1.66	1.46	66.0	56.8	0.66±0.23	0.71±0.34
11	7.2±2.0	78.1±14.0	4.5±1.4	314	98.8±0.1	165,377	161,946	1.65	1.46	65.6	56.8	0.66±0.22	0.70±0.34
12	4.9±2.3	69.5±14.2	5.4±1.9	322	99.0±0.3	165,288	161,928	1.64	1.46	65.2	56.8	0.66±0.22	0.71±0.33
13	2.7±3.1	64.6±12.8	3.6±1.6	316	100.0±0.2	165,158	161,914	1.63	1.47	64.7	57.2	0.66±0.22	0.70±0.33
14	2.1±5.0	66.6±24.5	1.2±1.1	261	100.5±0.1	165,041	161,904	1.63	1.47	64.7	57.2	0.67±0.23	0.71±0.33
15	3.2±4.6	68.2±16.7	1.5±0.9	198	100.1±0.2	164,952	161,894	1.64	1.47	65.0	57.2	0.63±0.23	0.71±0.33
16	7.4±2.6	80.6±8.0	2.3±1.1	130	99.5±0.2	164,854	161,884	1.64	1.47	65.0	57.2	0.61±0.23	0.70±0.32
17	9.8±1.1	88.9±6.7	2.6±0.8	142	99.0±0.1	164,744	161,871	1.64	1.48	64.9	57.6	0.63±0.23	0.68±0.31
18	14.2±1.5	95.6±2.6	2.6±1.2	88	98.7±0.1	164,640	161,859	1.65	1.48	65.3	57.6	0.63±0.22	0.67±0.30
19	14.2±0.6	95.9±2.1	2.3±0.9	163	98.3±0.2	164,520	161,849	1.65	1.48	65.2	57.6	0.66±0.22	0.68±0.30
20	12.8±0.7	91.0±4.3	3.7±1.0	111	98.2±0.2	164,406	161,837	1.65	1.48	65.2	57.6	0.66±0.21	0.67±0.31
21	8.0±1.9	79.4±8.1	2.6±1.2	29	99.0±0.1	164,301	161,825	1.66	1.48	65.6	57.6	0.71±0.25	0.65±0.30
22	5.9±1.3	88.8±4.3	1.6±0.7	210	98.6±0.2	164,196	161,814	1.66	1.49	65.5	57.9	0.71±0.27	0.65±0.31
23	9.5±2.5	89.4±7.7	2.4±0.8	208	97.9±0.1	164,078	161,802	1.67	1.49	65.9	57.9	0.63±0.24	0.67±0.31
24	10.4±1.7	96.4±0.8	4.8±1.2	313	96.6±0.7	163,950	161,784	1.68	1.49	66.2	57.9	0.70±0.24	0.67±0.31
25	0.2±1.6	81.8±12.6	5.5±2.2	53	97.4±0.6	163,852	161,761	1.68	1.49	66.2	57.9	0.67±0.24	0.68±0.31
26	0.9±3.7	79.3±10.1	3.9±1.1	172	98.1±0.1	163,724	161,745	1.69	1.49	66.5	57.9	0.66±0.24	0.67±0.30
27	8.0±1.9	57.3±13.7	6.7±1.1	183	97.6±0.3	163,581	161,731	1.69	1.49	66.4	57.9	0.73±0.23	0.74±0.28
28	3.3±1.9	83.1±8.0	5.6±2.5	93	98.1±0.6	163,447	161,715	1.68	1.49	66.0	57.9	0.68±0.26	0.69±0.31
29	1.4±2.8	87.3±8.6	2.2±0.9	227	99.0±0.1	163,314	161,703	1.67	1.49	65.6	57.9	0.71±0.27	0.67±0.31
30	5.3±1.5	85.7±8.9	3.0±1.2	237	98.0±0.6	163,175	161,692	1.66	1.49	65.1	57.9	0.68±0.23	0.67±0.31
Mean	7.1	78	3.6	151	98.5	164,831	161,898	1.67	1.48	66.1	57.3	0.66	0.69
Std. Dev.	4.2	12	1.4	89	0.9	903	127	0.02	0.01	1.1	0.5	0.03	0.02
Min	0.2	56	1.2	29	96.6	163,175	161,692	1.63	1.46	64.7	56.8	0.61	0.65
Max	15.3	96	6.7	322	100.5	166,224	162,130	1.71	1.49	68.2	57.9	0.73	0.74

Table 1. Daily means (±SD) of weather data and bird characteristics at Mt. Victory.

December-04													
Day	Weather Variables					Bird Characteristics							
	T, °C	RH, %	Wind Speed, m/s	Wind Direction, °	Bar. P, kPa	Inventory		Mass, kg		Density, kg/m^2		Activity, mV	
						B1	B2	B1	B2	B1	B2	B1	B2
1	4.3±3.0	75.4±17.0	8.1±3.0	98	97.8±0.8	163,016	161,677	1.65	1.49	64.6	57.9	0.62±0.20	0.68±0.31
2	1.4±3.1	79.3±11.7	3.1±1.0	122	98.2±0.3	162,885	161,661	1.64	1.48	64.2	57.5	0.66±0.25	0.67±0.32
3	0.6±1.8	75.5±11.8	3.9±1.6	96	98.1±0.2	162,784	161,644	1.63	1.48	63.8	57.5	0.65±0.23	0.67±0.31
4	2.1±4.8	74.0±13.6	5.2±2.0	136	97.8±0.2	162,652	161,629	1.63	1.48	63.7	57.5	0.67±0.25	0.67±0.31
5	4.3±3.7	76.1±9.3	3.0±1.1	224	98.4±0.2	162,500	161,618	1.64	1.49	64.1	57.9	0.62±0.25	0.67±0.31
6	8.5±2.4	89.2±8.2	3.1±1.1	198	97.8±0.2	162,356	161,607	1.64	1.49	64.0	57.9	0.66±0.24	0.67±0.30
7	12.6±2.4	87.7±11.0	7.9±3.5	150	96.8±0.5	162,225	161,594	1.65	1.49	64.3	57.9	0.65±0.23	0.67±0.29
8	5.4±1.8	81.7±9.7	3.5±2.0	119	98.4±0.3	162,109	161,578	1.66	1.49	64.7	57.9	0.66±0.24	0.66±0.29
9	5.5±2.1	89.2±5.7	2.9±0.8	213	97.5±0.4	161,997	161,560	1.66	1.49	64.6	57.9	0.65±0.23	0.66±0.30
10	7.0±1.6	97.2±0.8	2.7±1.2	36	96.5±0.1	161,896	161,543	1.67	1.50	65.0	58.2	0.62±0.22	0.64±0.30
11	1.3±0.9	91.0±2.7	5.5±1.0	45	96.9±0.3	161,789	161,530	1.67	1.50	64.9	58.2	0.60±0.22	0.64±0.29
12	2.5±2.1	76.6±5.8	7.7±2.2	107	96.9±0.4	161,660	161,512	1.67	1.50	64.9	58.2	0.59±0.21	0.65±0.28
13	-0.6±1.8	74.0±9.1	8.9±2.0	71	97.5±0.6	161,546	161,489	1.68	1.50	65.2	58.2	0.59±0.21	0.64±0.28
14	-4.9±1.4	79.2±10.4	4.0±1.7	49	99.3±0.3	161,454	161,467	1.68	1.50	65.2	58.2	0.61±0.22	0.62±0.27
15	-3.4±2.2	72.0±8.6	4.3±1.1	126	99.6±0.2	161,340	161,448	1.68	1.50	65.1	58.2	0.61±0.22	0.69±0.22
16	0.0±3.1	63.5±11.6	6.4±1.4	128	98.8±0.3	161,239	161,431	1.69	1.50	65.5	58.2	0.58±0.21	0.75±0.09
17	-1.0±1.7	68.9±9.4	2.3±1.0	321	98.9±0.2	161,138	161,411	1.69	1.50	65.5	58.2	0.57±0.20	0.66±0.19
18	0.2±4.1	78.4±10.4	4.2±1.6	143	97.8±0.4	160,999	161,392	1.69	1.50	65.4	58.2	0.56±0.20	0.60±0.27
19	-8.5±6.2	69.3±18.0	5.9±2.1	24	98.2±0.5	160,896	161,372	1.69	1.50	65.4	58.2	0.57±0.20	0.67±0.23
20	-13.3±4.5	59.7±13.4	5.1±2.4	151	98.2±0.5	160,837	161,345	1.69	1.50	65.3	58.2	0.57±0.20	0.66±0.20
21	-0.2±5.5	63.9±10.8	5.2±1.5	133	97.6±0.3	160,775	161,316	1.69	1.50	65.3	58.2	0.57±0.20	0.62±0.28
22	-2.8±2.6	90.0±6.8	3.7±1.4	19	98.3±0.2	160,743	161,301	1.69	1.50	65.3	58.2	0.57±0.21	0.61±0.28
23	-6.3±2.3	94.3±1.8	6.9±2.0	47	98.0±0.7	160,677	161,290	1.69	1.50	65.3	58.1	0.61±0.17	0.66±0.24
24	-14.5±2.8	87.2±1.8	3.4±1.1	103	99.0±0.1	160,605	161,244	1.69	1.50	65.2	58.1	0.60±0.14	0.58±0.19
25	-15.5±7.1	85.3±4.6	2.2±0.9	194	98.7±0.2	160,565	161,199	1.69	1.50	65.2	58.1	0.56±0.20	0.46±0.25
26	-7.3±2.2	90.3±2.6	2.8±1.2	45	98.8±1.0	160,442	161,093	1.69	1.51	65.2	58.5	0.58±0.21	0.48±0.23
27	-10.1±1.2	86.9±4.6	1.7±0.9	235	100.1±0.2	160,316	160,985	1.69	1.51	65.1	58.4	0.60±0.20	0.50±0.22
28	-3.6±4.6	78.1±10.1	5.0±1.3	157	99.0±0.4	160,233	160,949	1.69	1.52	65.1	58.8	0.59±0.20	0.51±0.21
29	4.3±1.4	72.6±5.7	3.8±1.9	129	98.7±0.1	160,119	160,915	1.70	1.53	65.4	59.2	0.61±0.16	0.55±0.18
30	5.0±2.0	90.7±4.6	3.5±1.7	183	98.8±0.2	160,021	160,842	1.70	1.54	65.4	59.5	0.57±0.21	0.52±0.23
31	9.5±0.6	86.5±7.5	6.7±1.1	135	98.4±0.2	159,921	160,757	1.70	1.54	65.3	59.5	0.57±0.21	0.53±0.23
Mean	-0.6	80	4.6	119	98.2	161,346	161,367	1.68	1.50	64.9	58.2	0.60	0.62
Std. Dev.	6.9	10	1.9	65	0.8	899	254	0.02	0.01	0.5	0.5	0.03	0.07
Min	-15.5	60	1.7	19	96.5	159,921	160,757	1.63	1.48	63.7	57.5	0.56	0.46
Max	12.6	97	8.9	321	100.1	163,016	161,677	1.70	1.54	65.5	59.5	0.67	0.75

Table 1. Daily means (±SD) of weather data and bird characteristics at Mt. Victory.

January-05													
Day	Weather Variables					Bird Characteristics							
	T, °C	RH, %	Wind Speed, m/s	Wind Direction, °	Bar. P, kPa	Inventory		Mass, kg		Density, kg/m²		Activity, mV	
						B1	B2	B1	B2	B1	B2	B1	B2
1	7.7±1.3	88.3±8.6	2.9±0.8	305	99.3±0.2	159,770	160,719	1.69	1.55	64.9	59.9	0.59±0.20	0.54±0.24
2	11.3±1.9	95.9±3.2	4.3±1.1	149	99.0±0.1	159,606	160,676	1.68	1.54	64.4	59.5	0.55±0.20	0.52±0.24
3	11.1±2.4	97.9±0.1	2.8±1.2	320	98.6±0.2	159,418	160,640	1.67	1.54	64.0	59.5	0.57±0.21	0.55±0.24
4	4.2±0.9	94.8±2.4	3.8±0.8	309	98.8±0.1	159,257	160,617	1.66	1.54	63.5	59.4	0.58±0.22	0.55±0.25
5	1.4±1.1	95.9±1.0	2.6±2.9	303	98.1±0.4	159,093	160,537	1.65	1.54	63.1	59.4	0.58±0.21	0.54±0.24
6	0.7±1.2	89.3±8.2	3.9±3.7	41	97.4±0.5	158,925	160,456	1.64	1.54	62.6	59.4	0.59±0.21	0.53±0.23
7	-0.5±1.7	76.8±4.5	2.6±1.0	182	98.7±0.2	158,770	160,423	1.63	1.53	62.2	59.0	0.59±0.23	0.52±0.23
8	0.6±0.7	92.8±3.2	2.9±1.0	57	98.7±0.5	158,389	160,366	1.62	1.53	61.7	59.0	0.58±0.22	0.52±0.23
9	2.9±2.2	84.5±9.0	3.5±1.6	162	98.7±0.4	158,051	160,317	1.63	1.53	61.9	59.0	0.58±0.22	0.51±0.23
10	2.7±1.0	84.8±3.2	3.7±1.9	96	98.6±0.2	157,938	160,281	1.63	1.53	61.9	58.9	0.58±0.20	0.51±0.23
11	4.0±1.4	94.9±4.1	2.8±1.0	261	97.9±0.3	157,756	160,250	1.64	1.53	62.2	58.9	0.58±0.22	0.51±0.23
12	13.9±3.5	88.2±10.3	4.8±1.9	161	97.5±0.1	157,587	160,229	1.65	1.53	62.5	58.9	0.54±0.21	0.52±0.22
13	13.0±4.9	76.0±14.4	7.0±1.6	129	97.1±0.4	157,485	160,201	1.65	1.53	62.5	58.9	0.55±0.20	0.52±0.21
14	-2.1±2.2	74.6±8.5	4.8±1.7	34	99.4±0.6	157,383	160,181	1.66	1.53	62.8	58.9	0.59±0.22	0.50±0.21
15	-5.5±1.1	70.1±6.5	2.5±0.7	3	100.3±0.1	157,277	160,158	1.65	1.53	62.4	58.9	0.59±0.22	0.49±0.21
16	-7.9±1.9	81.0±6.7	4.4±1.2	360	99.8±0.1	157,053	160,118	1.63	1.53	61.5	58.9	0.60±0.22	0.48±0.21
17	-12.0±1.6	77.4±6.2	5.1±1.5	66	100.0±0.1	156,818	160,087	1.61	1.53	60.7	58.9	0.59±0.21	0.46±0.20
18	-13.6±3.3	67.2±14.5	3.6±1.9	142	100.1±0.5	156,693	160,062	1.59	1.53	59.9	58.9	0.57±0.22	0.44±0.19
19	-3.9±3.1	82.6±12.5	6.8±1.8	96	98.0±0.3	156,518	160,035	1.56	1.53	58.7	58.8	0.58±0.23	0.45±0.19
20	-5.1±1.2	79.6±6.8	3.5±1.3	309	98.2±0.1	156,346	160,008	1.54	1.54	57.9	59.2	0.58±0.23	0.44±0.19
21	-8.6±1.1	63.8±11.3	4.1±1.1	294	98.6±0.2	156,235	159,979	1.52	1.54	57.1	59.2	0.58±0.23	0.44±0.19
22	-8.0±2.1	82.8±9.6	6.2±2.1	36	97.3±0.6	156,075	159,938	1.50	1.54	56.3	59.2	0.60±0.21	0.43±0.18
23	-14.1±1.8	79.0±5.3	4.6±1.9	46	99.2±0.3	155,886	159,876	1.48	1.54	55.5	59.2	0.64±0.20	0.42±0.17
24	-9.2±6.4	72.0±10.8	4.4±1.9	121	98.3±0.5	155,537	159,694	1.46	1.54	54.6	59.1	0.64±0.15	0.41±0.17
25	0.0±2.3	70.8±9.2	3.5±1.6	149	97.4±0.5	154,960	159,524	1.44	1.54	53.6	59.0	0.57±0.18	0.43±0.17
26	-0.5±3.8	77.0±5.4	5.8±1.4	356	97.6±0.8	154,598	159,474	1.41	1.54	52.4	59.0	0.56±0.21	0.45±0.19
27	-11.1±1.7	76.0±8.2	3.5±0.8	321	99.8±0.4	154,485	159,429	1.39	1.54	51.6	59.0	0.56±0.21	0.41±0.18
28	-8.9±5.4	58.6±21.1	2.7±1.0	248	100.0±0.3	154,385	159,392	1.37	1.54	50.8	59.0	0.57±0.23	0.40±0.17
29	-2.2±1.6	65.8±21.8	2.6±0.9	219	98.8±0.3	154,263	159,362	1.36	1.54	50.4	59.0	0.57±0.23	0.40±0.18
30	-2.3±2.0	84.1±12.1	2.8±0.6	343	98.6±0.2	154,090	159,341	1.35	1.53	50.0	58.6	0.57±0.23	0.40±0.18
31	-7.5±3.0	86.6±7.1	1.6±0.7	327	99.1±0.1	154,004	159,314	1.34	1.53	49.6	58.6	1.12±0.71	0.99±0.70
Mean	-1.6	81	3.9	15	98.7	156,924	160,054	1.56	1.53	58.8	59.1	0.60	0.49
Std. Dev.	7.6	10	1.3	91	0.9	1,754	422	0.11	0.00	4.9	0.3	0.10	0.10
Min	-14.1	59	1.6	3	97.1	154,004	159,314	1.34	1.53	49.6	58.6	0.54	0.40
Max	13.9	98	7.0	360	100.3	159,770	160,719	1.69	1.55	64.9	59.9	1.12	0.99

Table 2. Daily means (±SD) of environment data at Mt. Victory.

Day	Barn 1							Barn 2							
	Static Pressure		Ventilation	Cage (Center)		Exhaust Air (F38)		Static Pressure			Ventilation	Cage (Center)		Exhaust Air (F13)	
	East wall dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %	East wall dP, Pa	East curt. dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %
1	-	-	-	-	-	-	-	-25.9±0.4	-14.1	-40.0±0.5	329±2	-	-	-	-
2	-	-	-	-	-	-	-	-27.5±0.8	-15.4	-40.7±0.6	323±3	-	-	-	-
3	-	-	-	-	-	-	-	-28.3±1.2	-15.4	-42.0±3.1	314±11	-	-	-	-
4	-	-	-	-	-	-	-	-29.9±2.0	-14.9	-38.6±4.9	322±12	-	-	-	-
5	-14.2±3.9	-14.8±4.4	-	-	-	-	-	-29.5±0.8	-15.3	-47.9±1.0	299±3	-	-	-	-
6	-17.9±7.6	-18.6±7.9	-	-	-	-	-	-29.8±3.4	-17.1	-41.6±13.9	275±52	-	-	-	-
7	-19.8±6.5	-20.0±6.6	339±63	-	-	-	-	-28.2±1.8	-17.8	-32.8±17.0	256±58	-	-	-	-
8	-17.7±4.4	-18.0±4.5	336±48	-	-	-	-	-29.2±2.3	-16.9	-31.4±8.6	299±46	-	-	-	-
9	-16.7±6.0	-16.7±6.1	310±79	-	-	-	-	-31.6±2.6	-17.5	-30.9±11.2	284±52	-	-	-	-
10	-18.6±3.8	-20.8±4.7	350±46	-	-	-	-	-32.2±1.5	-16.5	-38.0±4.5	312±18	-	-	-	-
11	-12.0±6.6	-13.6±7.2	260±91	-	-	-	-	-29.7±2.9	-18	-26.1±12.0	255±53	-	-	-	-
12	-9.0±5.6	-9.7±5.7	214±87	-	-	-	-	-26.7±3.4	-16.9	-21.0±12.9	223±74	-	-	19.9±2.3	60±9
13	-12.1±8.1	-13.0±8.0	213±77	-	-	21.2±0.5	64±4	-28.2±3.2	-17.2	-22.6±13.8	221±58	-	-	20.1±0.7	66±5
14	-26.8±4.0	-27.1±4.0	205±84	-	-	22.6±1.8	62±7	-28.9±3.5	-17.1	-27.6±15.0	246±78	-	-	20.9±1.8	64±9
15	-25.6±3.8	-25.5±3.4	166±70	-	-	24.1±0.8	62±5	-30.5±2.8	-17.3	-29.0±14.2	257±50	-	-	21.1±1.1	66±7
16	-27.3±4.6	-27.2±4.6	212±113	-	-	24.1±1.7	60±9	-29.6±3.1	-17.9	-28.1±14.9	254±65	-	-	21.4±2.8	65±11
17	-27.1±3.8	-27.4±3.7	243±103	-	-	24.6±2.2	56±10	-31.2±2.7	-17.2	-32.5±14.6	265±57	-	-	22.7±3.1	59±12
18	-29.7±5.1	-30.4±4.5	283±51	-	-	26.1±2.9	62±4	-33.3±1.1	-16.1	-43.2±2.9	298±7	-	-	24.1±3.4	66±5
19	-34.6±6.3	-35.2±6.3	303±26	-	-	26.9±1.7	70±3	-34.1±2.3	-18.5	-42.4±3.2	302±9	-	-	24.5±2.3	77±5
20	-26.0±3.7	-25.5±3.9	226±65	24.4±0.5	71±3	23.4±0.5	76±1	-37.0±1.0	-23.1	-40.1±1.4	307±5	22.0±2.2	77±3	20.7±1.7	83±2
21	-26.6±4.9	-27.3±5.1	202±90	24.2±1.3	56±7	23.1±1.3	63±9	-39.3±1.8	-21.1	-43.1±1.7	290±13	19.7±3.2	67±14	18.8±2.7	72±13
22	-27.8±6.7	-27.7±6.8	222±102	25.3±4.0	54±6	24.0±4.0	61±7	-39.9±9.0	-23	-37.7±11.2	253±33	20.9±6.3	65±13	19.9±4.9	70±11
23	-29.5±4.8	-29.5±4.6	266±77	26.8±2.5	56±7	25.8±2.5	61±7	-40.7±6.6	-29	-31.7±15.4	227±51	25.6±3.9	60±9	24.2±3.6	66±10
24	-35.5±3.5	-35.4±3.7	310±15	26.4±3.4	64±6	25.7±3.3	67±5	-45.6±2.4	-31.2	-37.7±14.3	229±36	25.8±3.3	66±6	25.5±2.9	69±4
25	-34.2±2.7	-33.7±2.4	317±11	26.6±2.2	70±4	26.2±2.0	73±4	-46.3±0.6	-29.3	-45.5±0.7	241±13	25.5±2.4	74±5	25.5±2.0	76±4
26	-33.4±1.5	-33.4±1.4	318±6	27.9±1.6	68±5	27.0±1.4	73±4	-46.0±0.5	-29.5	-45.7±0.7	256±3	26.5±1.8	73±6	26.4±1.5	75±5
27	-31.8±2.8	-32.5±2.6	322±9	28.7±2.5	69±6	28.0±2.4	72±6	-45.1±1.2	-30.7	-45.1±1.8	257±7	28.3±3.0	71±7	27.7±2.5	74±6
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mean	-24.1	-24.5	268	26.3	63	24.8	65	-33.5	-19.8	-36.4	274	24.3	69	22.7	69
Std. Dev.	7.8	7.5	54	1.5	7	1.8	6	6.4	5.3	7.4	33	2.8	5	2.6	6
Min	-35.5	-35.4	166	24.2	54	21.2	56	-46.3	-31.2	-47.9	221	19.7	60	18.8	59
Max	-9.0	-9.7	350	28.7	71	28.0	76	-25.9	-14.1	-21.0	329	28.3	77	27.7	83

Table 2. Daily means (±SD) of environment data at Mt. Victory.

	September-04														
Day	Barn 1							Barn 2							
	Static Pressure		Ventilation	Cage (Center)		Exhaust Air (F38)		Static Pressure			Ventilation	Cage (Center)		Exhaust Air (F13)	
	East wall dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %	East wall dP, Pa	East curt. dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-13.8±9.6	-	26.2±1.9	52±7	24.8±2.3	58±9	-43.8±5.4	-34.8	-	0±0	25.4±3.7	55±9	23.7±3.6	62±10
13	-11.9±8.3	-12.5±8.3	-	26.2±2.0	58±3	25.0±2.2	63±4	-44.7±1.5	-36.6	-	0±0	25.5±3.2	59±4	23.9±3.1	66±5
14	-13.2±8.2	-14.2±8.4	-	26.3±1.5	61±4	25.2±1.6	66±5	-45.8±0.8	-34.6	-	97±124	25.7±2.7	63±5	24.3±2.5	70±5
15	-13.5±8.4	-14.3±8.5	250±97	26.5±1.8	59±6	25.2±2.1	65±7	-45.0±1.8	-35.1	-37.2±11.7	237±35	25.8±2.9	61±7	24.4±2.8	68±8
16	-15.3±7.0	-16.8±7.5	287±80	26.6±1.7	65±3	25.5±1.7	69±2	-44.7±1.4	-33.7	-44.2±2.1	261±9	26.5±2.6	66±3	25.1±2.5	72±3
17	-2.8±2.1	-5.6±1.4	149±27	23.6±1.0	59±3	22.5±0.9	66±3	-41.4±6.1	-34.7	-24.9±11.2	202±47	22.5±0.9	60±4	21.0±1.0	69±4
18	-4.9±5.4	-7.1±5.0	155±87	22.9±1.6	51±8	21.7±1.4	59±10	-34.5±10.7	-29.4	-	169±70	22.2±2.1	51±9	20.0±2.1	61±10
19	-7.6±7.6	-7.6±6.3	168±106	23.6±0.9	51±4	22.3±1.2	59±7	-36.4±9.2	-30.9	-	175±72	22.8±2.3	50±6	20.6±2.3	60±7
20	-9.3±8.1	-9.9±8.3	181±122	24.3±1.7	46±9	22.5±2.1	53±13	-36.1±12.0	-29.5	-	175±76	23.7±2.7	46±9	21.2±3.0	55±12
21	-10.5±8.6	-11.4±9.0	198±121	25.5±1.9	46±6	23.5±2.6	53±9	-37.5±9.7	-30.4	-	194±80	24.6±3.5	47±7	22.4±3.5	56±8
22	-13.0±9.1	-14.2±9.6	240±130	26.0±2.5	46±9	24.5±3.1	51±11	-38.0±9.7	-30.5	-	214±81	26.1±3.6	47±8	23.9±3.7	54±10
23	-12.7±8.7	-13.8±9.1	243±113	26.4±2.5	50±5	25.0±2.9	55±8	-43.2±3.2	-35.3	-39.6±9.9	223±53	26.0±3.6	52±6	24.2±3.6	58±7
24	-14.0±8.5	-14.9±8.8	260±105	26.7±2.1	55±5	25.5±2.3	59±6	-44.0±1.4	-35.7	-37.3±11.4	235±45	26.3±3.4	57±6	24.7±3.2	63±7
25	-10.0±6.8	-11.6±7.0	234±88	25.0±0.5	52±6	23.8±0.6	57±6	-43.5±1.2	-34.6	-42.5±7.4	252±38	24.8±1.3	53±7	23.1±1.2	60±6
26	-5.4±3.8	-6.4±3.4	156±68	24.2±0.8	55±3	22.7±0.9	63±5	-39.1±6.7	-33.6	-	195±65	23.2±1.7	56±4	21.0±1.7	66±5
27	-8.9±7.3	-9.8±7.8	189±110	24.6±1.0	54±4	22.7±1.5	62±6	-38.6±6.7	-33.2	-	200±68	24.3±2.3	55±5	21.8±2.6	65±6
28	-5.9±6.3	-8.3±6.5	172±96	23.8±1.2	56±3	22.5±0.9	64±4	-40.7±6.3	-35.5	-	184±62	23.2±1.8	57±4	21.2±1.8	67±5
29	-2.1±1.8	-4.8±1.0	110±30	22.2±1.6	58±2	21.0±0.8	67±2	-36.2±8.9	-33.5	-	141±41	21.6±1.0	58±1	19.3±0.9	69±1
30	-4.7±3.1	-6.2±2.9	126±72	24.4±1.0	47±9	21.3±1.7	58±11	-35.5±11.1	-30.5	-	163±76	22.7±1.7	48±9	19.8±2.1	60±11
Mean	-9.2	-10.7	195	25.0	54	23.5	60	-40.5	-33.3	-37.6	174	24.4	55	22.4	63
Std. Dev.	4.0	3.6	50	1.4	5	1.5	5	3.7	2.2	6.2	71	1.5	6	1.8	5
Min	-15.3	-16.8	110	22.2	46	21.0	51	-45.8	-36.6	-44.2	0	21.6	46	19.3	54
Max	-2.1	-4.8	287	26.7	65	25.5	69	-34.5	-29.4	-24.9	261	26.5	66	25.1	72

Table 2. Daily means (±SD) of environment data at Mt. Victory.

Day	Barn 1							Barn 2							
October-04	Static Pressure		Ventilation	Cage (Center)		Exhaust Air (F38)		Static Pressure			Ventilation	Cage (Center)		Exhaust Air (F13)	
	East wall dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %	East wall dP, Pa	East curt. dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %
1	-9.0±7.4	-9.8±7.4	176±122	24.7±1.2	48±4	21.8±2.4	57±7	-37.0±14.2	-30	-	173±82	23.5±2.5	50±6	21.0±3.0	59±7
2	-3.9±1.0	-6.4±1.3	139±21	24.3±0.7	53±8	22.4±0.6	61±8	-40.8±11.3	-34.7	-	188±34	22.7±0.6	55±9	21.1±0.5	62±10
3	-3.6±1.1	-5.4±1.4	84±51	24.7±1.3	42±9	20.3±1.6	53±11	-25.9±12.9	-20.7	-	123±72	22.6±1.9	41±9	18.5±1.9	52±12
4	-10.6±10.7	-13.4±10.5	107±38	22.1±1.4	40±4	20.3±1.0	50±5	-27.8±11.9	-23.6	-	130±55	21.4±1.6	40±5	19.0±1.7	50±5
5	-24.8±5.7	-26.0±5.8	88±34	22.1±1.6	45±7	19.2±1.9	55±7	-23.0±12.3	-19.6	-	96±45	22.8±1.4	44±7	17.8±2.2	56±8
6	-24.7±5.9	-26.4±5.9	126±78	23.2±1.5	41±10	20.1±2.3	50±12	-29.0±13.5	-22.4	-	141±83	22.6±1.7	39±10	19.1±2.6	50±13
7	-26.7±5.0	-27.4±4.8	155±103	23.1±1.5	40±8	21.1±2.1	48±11	-28.9±15.3	-20.3	-	136±79	23.8±1.8	40±9	20.7±2.5	49±11
8	-26.6±5.2	-27.9±5.4	190±110	24.2±2.0	48±5	22.4±2.5	56±7	-30.4±13.7	-23	-	141±79	26.1±1.4	47±5	23.0±2.4	56±6
9	-24.9±3.5	-27.9±4.0	190±79	24.4±0.6	43±8	22.9±0.7	49±9	-31.6±10.3	-26.4	-	138±56	26.1±0.6	41±8	24.0±0.7	50±8
10	-24.5±4.6	-26.0±4.5	111±49	22.8±1.2	43±6	20.8±1.4	52±7	-21.4±11.5	-18.3	-	89±39	23.9±1.3	42±7	20.7±1.5	52±7
11	-24.8±5.7	-25.5±5.6	99±41	23.0±1.3	50±5	20.2±1.6	60±6	-19.1±8.3	-16.2	-	80±28	23.9±1.4	49±5	20.3±1.8	60±5
12	-25.5±5.6	-25.4±5.5	98±47	22.7±1.2	47±7	20.0±2.0	58±9	-19.4±9.3	-16.2	-	79±30	25.6±1.7	48±8	20.5±2.3	59±8
13	-24.5±4.2	-25.7±4.0	88±19	23.0±0.5	52±3	20.6±0.5	63±3	-15.7±3.4	-12.8	-	70±13	26.5±0.9	52±4	21.5±0.4	63±3
14	-23.7±4.0	-26.0±4.0	157±97	23.7±0.7	53±3	20.9±0.6	65±3	-17.1±5.1	-14.1	-	77±25	27.3±1.8	53±3	22.6±0.8	66±3
15	-24.2±4.9	-27.6±5.4	81±17	22.9±0.3	55±2	19.9±0.6	68±1	-13.7±1.4	-10.8	-	58±6	25.4±1.4	55±3	21.4±0.8	67±2
16	-22.3±6.2	-29.7±6.9	68±19	22.3±0.3	49±3	18.6±0.3	64±2	-12.5±1.2	-10.9	-	57±1	24.9±0.6	50±2	19.7±0.5	63±2
17	-23.7±6.2	-28.5±6.3	64±20	22.5±0.9	46±4	18.2±1.0	62±4	-13.6±1.1	-11.1	-	58±3	25.0±2.1	49±4	18.7±1.6	63±2
18	-28.1±6.5	-26.7±6.3	59±18	22.0±0.4	53±5	18.4±0.7	71±4	-14.2±0.8	-11.1	-	58±1	25.1±2.0	55±6	17.0±1.1	69±3
19	-24.3±5.1	-26.0±5.1	77±20	23.3±1.0	56±2	20.6±1.0	72±1	-14.2±2.2	-12.1	-	63±12	23.6±1.7	57±3	19.4±2.4	73±1
20	-23.3±4.4	-25.7±4.4	83±18	23.6±0.9	59±1	21.7±0.5	73±1	-16.1±5.7	-14.3	-	77±24	23.5±1.0	58±2	20.8±0.4	73±1
21	-24.1±5.1	-25.8±4.9	88±24	23.1±0.5	56±2	20.9±0.4	71±2	-16.0±5.9	-14	-	103±66	23.9±0.6	54±2	20.5±0.4	70±2
22	-25.8±5.3	-26.1±5.3	88±32	22.1±1.5	55±3	20.0±1.3	70±4	-19.6±8.5	-16.8	-	76±26	24.9±1.4	52±3	19.9±1.4	68±4
23	-25.1±3.4	-25.6±3.1	106±29	23.2±1.5	59±4	21.1±1.1	73±2	-25.4±9.1	-21.8	-	90±27	23.0±0.8	59±6	20.3±1.5	72±2
24	-23.5±3.2	-26.2±3.3	122±34	24.5±0.8	56±4	22.0±0.6	68±5	-28.3±8.8	-26	-	104±28	24.8±0.9	55±5	21.9±0.9	67±5
25	-25.6±4.1	-26.7±4.2	126±75	22.9±1.4	51±7	21.1±1.6	63±9	-25.9±13.5	-22.1	-	103±61	23.8±2.2	50±7	20.7±2.0	61±9
26	-26.0±3.9	-26.1±3.8	133±67	23.0±1.5	49±6	21.4±1.4	59±8	-28.9±14.0	-25.3	-	111±54	24.6±0.8	46±5	21.4±1.3	57±7
27	-24.5±3.9	-25.2±3.6	137±60	23.6±0.8	52±4	22.2±0.8	61±6	-30.3±11.8	-27.1	-	120±51	24.1±1.0	49±4	21.5±1.0	60±6
28	-24.5±4.1	-25.6±3.9	122±54	23.3±1.1	53±4	21.8±1.0	64±6	-28.8±13.6	-21.4	-	101±45	24.0±2.0	54±6	22.0±1.2	63±6
29	-	-	-	-	-	23.8±1.3	70±4	-	-	-	-	-	-	24.4±1.4	69±4
30	-25.7±3.6	-31.8±5.3	256±82	24.6±0.9	53±15	24.0±1.1	58±15	-40.7±10.5	-31.9	-	175±55	25.8±0.9	52±14	24.7±0.7	58±14
31	-22.2±4.3	-26.7±4.4	100±27	23.0±1.1	44±5	20.9±0.6	55±6	-19.8±6.1	-17.6	-	80±19	24.9±1.1	46±5	22.6±0.8	55±5
Mean	-22.4	-24.3	117	23.3	50	21.0	61	-23.8	-19.8	-	103	24.3	49	20.9	61
Std. Dev.	6.3	6.4	43	0.8	5	1.4	7	7.9	6.4	-	36	1.3	6	1.8	7
Min	-28.1	-31.8	59	22.0	40	18.2	48	-40.8	-34.7	-	57	21.4	39	17.0	49
Max	-3.6	-5.4	256	24.7	59	24.0	73	-12.5	-10.8	-	188	27.3	59	24.7	73

Table 2. Daily means (±SD) of environment data at Mt. Victory.

Day	Barn 1							Barn 2							
	November-04														
	Static Pressure		Ventilation	Cage (Center)		Exhaust Air (F38)		Static Pressure			Ventilation	Cage (Center)		Exhaust Air (F13)	
	East wall dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %	East wall dP, Pa	East curt. dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %
1	-26.8±4.3	-25.6±4.1	91±24	21.9±1.2	50±3	20.3±0.9	62±3	-20.6±6.0	-17.3	-	76±15	24.0±0.5	49±2	21.2±1.0	61±3
2	-24.8±4.2	-27.0±4.3	134±55	24.2±1.2	59±5	22.5±1.0	70±4	-34.2±10.9	-28.2	-	110±41	24.4±0.9	59±5	22.6±0.8	70±4
3	-27.1±6.9	-25.8±6.5	68±22	21.4±0.7	53±3	19.8±0.4	67±2	-22.6±3.7	-12.6	-	63±10	23.5±0.7	51±2	21.2±0.4	67±2
4	-24.1±6.0	-27.9±5.9	76±23	22.2±1.4	55±3	20.3±0.7	70±2	-23.0±4.4	-14.8	-	67±14	23.8±0.7	54±3	21.6±0.6	68±2
5	-24.2±6.1	-28.0±6.1	63±19	20.9±1.2	51±4	19.1±0.7	67±3	-22.2±2.6	-12.7	-	60±9	23.6±0.9	50±3	20.4±0.5	65±3
6	-23.4±4.6	-27.1±4.8	82±30	22.5±1.8	47±3	20.3±1.3	62±4	-28.0±10.2	-19.3	-	74±23	24.9±0.6	46±3	21.5±0.9	60±4
7	-23.4±4.9	-26.6±5.1	94±37	23.0±1.5	49±4	21.3±0.9	62±5	-27.5±11.0	-21.8	-	84±32	24.8±0.4	47±4	22.3±0.5	60±5
8	-25.8±10.0	-28.1±10.2	57±28	20.9±1.2	50±6	18.9±0.7	65±4	-23.2±2.9	-11.3	-	55±5	24.5±0.8	47±3	20.1±0.7	63±3
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-25.1±10.0	-26.5±10.0	71±36	22.5±1.9	46±6	19.5±1.8	64±7	-28.8±9.7	-17.6	-	73±30	24.3±0.8	44±6	19.7±2.3	61±7
11	-25.8±10.4	-24.5±10.1	67±30	22.3±0.8	50±7	20.2±0.7	66±6	-23.2±4.4	-13.9	-	63±11	24.0±0.5	49±5	21.4±0.5	64±6
12	-26.9±9.8	-26.6±10.5	57±27	21.3±0.8	52±5	19.2±1.0	70±3	-25.6±2.7	-12.1	-	56±6	24.2±0.6	50±3	20.1±1.2	67±2
13	-29.9±10.7	-27.9±11.4	50±27	21.3±1.1	54±5	18.8±1.1	72±3	-26.7±2.0	-12.3	-	-	24.2±1.1	52±3	18.6±1.9	68±2
14	-28.0±10.7	-28.0±11.1	52±27	20.9±1.0	52±7	18.2±1.3	70±5	-28.0±3.4	-13.8	-	-	23.5±0.9	49±6	18.2±2.1	66±5
15	-19.2±13.0	-19.6±13.1	55±34	22.8±2.9	51±5	17.4±1.9	67±5	-28.4±2.8	-14.1	-	57±8	23.8±0.9	48±4	19.0±1.8	66±3
16	-12.6±10.4	-14.0±11.0	75±34	24.6±1.1	52±3	19.2±1.3	69±3	-31.6±6.4	-18.5	-	69±12	24.1±0.7	50±3	21.4±0.6	67±2
17	-4.9±1.8	-5.9±1.8	87±37	23.1±0.5	56±5	20.9±0.4	70±2	-30.6±8.7	-23.4	-	81±17	24.8±1.4	53±4	22.5±1.0	68±2
18	-6.3±2.1	-8.2±2.3	129±37	23.7±0.7	63±3	22.2±0.4	73±1	-38.4±8.7	-33.4	-	117±33	26.0±1.0	59±3	23.8±0.3	70±2
19	-6.4±1.5	-7.5±1.3	120±21	22.8±0.7	65±2	21.8±0.3	73±1	-37.3±4.7	-32.2	-	102±9	24.7±0.6	61±2	23.4±0.4	71±1
20	-4.8±1.1	-7.6±1.2	101±18	21.7±0.7	62±2	20.8±0.5	70±1	-32.0±6.2	-27.7	-	92±9	25.9±0.3	56±1	23.7±0.3	69±1
21	-4.2±1.6	-6.7±1.3	87±28	19.6±0.6	56±5	17.5±0.9	64±3	-23.9±5.8	-18.5	-	74±13	26.2±0.3	52±2	20.9±1.2	69±2
22	-6.6±1.9	-7.3±1.6	80±25	21.0±1.7	55±4	16.9±1.2	68±2	-25.8±4.8	-16.6	-	67±10	24.0±1.3	52±2	20.3±1.8	69±3
23	-4.7±1.5	-5.3±1.6	74±44	24.6±3.2	58±5	19.0±1.3	72±3	-33.0±7.5	-22.4	-	77±12	23.5±0.7	55±2	22.0±0.6	68±2
24	-4.4±3.2	-2.3±1.7	63±38	18.7±1.7	63±4	18.6±1.1	72±2	-30.6±7.1	-20.7	-	74±13	23.5±0.4	55±2	21.8±0.6	68±2
25	-3.5±1.1	-5.8±1.5	26±12	18.9±1.7	58±3	13.8±1.0	68±3	-26.2±2.7	-12.5	-	52±1	22.1±0.8	53±3	19.7±1.0	70±3
26	-5.6±0.9	-5.6±0.8	47±26	20.7±0.8	57±3	16.3±1.6	70±2	-30.9±7.8	-16.7	-	56±16	21.9±1.1	53±4	18.5±2.0	73±4
27	-6.9±1.4	-5.5±0.9	63±26	20.0±0.5	50±4	18.2±0.7	63±3	-32.9±6.4	-21.1	-	69±12	23.1±0.5	46±2	21.1±0.4	63±4
28	-3.7±1.6	-8.3±3.1	53±25	20.6±1.7	56±4	17.8±0.8	67±2	-28.2±7.6	-17.5	-	56±16	23.3±0.5	51±3	21.0±0.5	71±4
29	-6.0±1.3	-5.7±1.5	49±25	18.5±1.3	58±4	16.8±1.3	69±2	-30.9±10.7	-17.8	-	52±19	23.0±0.4	52±3	20.0±0.7	74±4
30	-6.3±1.6	-5.1±1.1	64±23	20.7±2.0	58±3	17.9±0.4	71±3	-33.1±10.9	-20.6	-	60±20	23.0±0.4	51±3	20.9±0.3	70±3
Mean	-15.2	-16.2	74	21.6	55	19.1	68	-28.5	-18.7	-	72	24.0	52	21.0	67
Std. Dev.	10.0	10.1	24	1.6	5	1.9	3	4.5	5.8	-	17	1.0	4	1.5	4
Min	-29.9	-28.1	26	18.5	46	13.8	62	-38.4	-33.4	-	52	21.9	44	18.2	60
Max	-3.5	-2.3	134	24.6	65	22.5	73	-20.6	-11.3	-	117	26.2	61	23.8	74

Table 2. Daily means (±SD) of environment data at Mt. Victory.

Day	Barn 1							Barn 2								
	Static Pressure		Ventilation	Cage (Center)		Exhaust Air (F38)		Static Pressure			Ventilation	Cage (Center)		Exhaust Air (F13)	
	East wall dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %	East wall dP, Pa	East curt. dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %
1	-11.3±11.0	-18.8±9.7	63±22	23.5±3.0	56±7	15.4±1.0	67±5	-28.9±10.2	-18.6	-	57±20	23.1±0.6	51±4	21.0±0.7	70±4
2	-17.1±10.4	-19.1±10.2	64±21	21.0±1.3	53±4	14.9±1.3	67±6	-30.1±9.9	-18.1	-	52±19	22.9±0.5	52±4	20.0±0.7	73±4
3	-4.6±0.9	-6.8±1.4	55±20	20.7±1.0	53±4	14.5±1.2	68±5	-29.6±9.8	-17.5	-	51±19	23.0±0.5	53±4	19.8±0.5	75±4
4	-4.0±1.1	-6.5±1.2	48±20	20.5±1.7	50±4	15.0±2.4	67±4	-32.2±10.4	-20.3	-	56±22	22.3±0.8	54±6	19.8±1.3	73±5
5	-5.3±1.7	-4.5±1.1	58±27	22.6±1.4	53±4	17.7±0.9	69±4	-33.0±10.6	-21.3	-	62±20	23.0±0.3	52±4	20.7±0.7	72±4
6	-19.3±9.0	-19.2±11.1	88±28	20.6±1.5	57±4	19.0±1.5	69±3	-39.1±8.5	-26.6	-	72±15	23.4±0.9	56±5	21.6±0.8	72±2
7	-22.9±3.7	-28.7±4.5	114±34	22.0±0.8	59±4	20.6±1.0	68±4	-40.9±9.6	-32.2	-	89±21	24.0±0.5	58±3	22.7±0.5	71±2
8	-25.2±2.6	-27.7±2.6	74±20	20.3±0.7	54±2	18.0±0.7	65±3	-31.6±7.2	-19.8	-	62±13	23.0±0.7	54±3	21.4±0.5	70±3
9	-27.1±2.6	-27.0±2.6	75±20	20.1±0.8	56±2	17.7±1.1	69±2	-33.7±7.7	-21.2	-	60±14	23.0±0.4	57±4	21.1±0.5	73±2
10	-25.0±2.4	-26.7±2.5	72±19	21.7±1.2	58±2	19.3±0.8	70±2	-35.4±8.7	-23.3	-	67±16	22.8±0.4	59±3	21.5±0.3	73±3
11	-25.4±3.6	-28.4±4.3	57±19	21.7±0.3	56±3	17.4±0.3	67±3	-29.6±7.3	-18	-	52±15	22.5±0.5	60±5	20.7±0.4	76±3
12	-22.1±4.5	-28.7±5.3	55±20	21.9±0.7	53±3	17.8±0.9	64±3	-29.4±7.3	-19.5	-	51±14	22.7±0.7	57±4	20.5±0.6	74±3
13	-21.7±5.5	-30.0±6.6	51±20	20.9±0.6	53±4	17.0±0.6	65±4	-26.1±6.0	-17.6	-	46±13	23.0±0.5	58±6	19.9±0.7	77±3
14	-25.3±5.5	-27.5±6.4	49±18	19.7±0.5	56±3	15.5±0.4	67±3	-29.5±6.2	-17.9	-	42±12	23.1±0.6	61±4	17.6±0.5	82±2
15	-25.1±6.2	-27.3±6.5	48±19	20.4±1.0	56±4	15.5±0.6	68±5	-30.1±6.4	-18.2	-	-	23.2±1.1	60±5	17.2±1.1	82±4
16	-25.0±5.0	-29.1±5.6	48±17	22.4±0.8	55±3	17.1±1.7	71±3	-30.8±6.1	-19.9	-	44±13	23.0±0.9	60±3	18.5±1.1	79±2
17	-26.2±5.9	-27.1±6.2	45±13	22.3±0.4	57±4	18.1±0.9	71±3	-30.6±6.3	-19.4	-	41±12	23.5±0.4	61±4	18.4±0.7	80±2
18	-26.6±5.0	-28.4±5.4	44±13	23.0±0.8	57±3	18.5±0.8	71±2	-32.0±6.4	-20.7	-	43±13	23.5±0.8	59±4	18.8±1.5	80±3
19	-21.3±6.4	-25.7±8.5	38±12	21.4±1.1	62±5	16.4±1.3	77±6	-28.0±10.5	-16.7	-	-	21.1±5.2	66±12	16.5±2.6	83±5
20	-22.6±7.9	-22.2±7.3	31±10	22.0±1.0	61±4	15.4±0.6	82±3	-27.8±7.2	-15.8	-	-	23.5±1.3	73±3	12.2±1.4	96±2
21	-25.0±4.7	-27.3±5.7	45±13	22.8±0.9	56±3	17.9±1.1	72±4	-31.4±5.8	-21.2	-	-	23.1±0.7	62±4	17.0±2.4	87±5
22	-25.8±5.3	-27.7±6.8	44±12	22.7±0.8	59±5	17.9±0.9	74±4	-30.2±6.3	-19.8	-	33±9	23.2±0.5	65±6	17.1±0.4	87±3
23	-25.0±5.0	-30.9±7.9	39±10	21.5±0.9	62±4	16.8±1.3	76±4	-24.5±5.2	-14.5	-	-	23.9±0.4	68±5	15.6±1.2	91±2
24	-21.1±5.9	-23.0±6.2	26±10	21.0±1.2	63±5	15.6±0.5	82±3	-23.4±1.7	-14	-	24±0	20.3±1.4	75±2	9.9±1.5	97±1
25	-25.7±7.7	-25.5±7.4	26±14	21.8±1.5	65±5	16.0±0.7	84±3	-25.7±5.3	-13.7	-	22±6	20.2±3.7	77±3	9.3±1.3	100±1
26	-25.4±6.8	-26.8±8.2	34±12	21.7±1.1	61±4	16.2±1.1	79±3	-27.2±7.6	-17.9	-	28±7	24.0±1.0	66±3	12.6±1.1	99±2
27	-26.0±7.2	-26.2±7.6	30±11	21.0±1.5	64±5	17.2±0.8	79±3	-28.4±7.0	-18	-	27±6	24.8±0.8	64±3	13.3±1.0	96±1
28	-29.2±4.3	-30.3±4.5	42±11	21.9±1.0	58±4	16.3±1.1	73±4	-33.6±6.7	-22.1	-	30±5	23.5±1.3	59±4	15.1±1.9	92±5
29	-29.1±1.7	-31.7±1.6	52±9	23.1±0.6	53±4	18.3±0.4	67±3	-33.5±9.8	-23.4	-	37±13	25.6±1.0	57±4	18.0±0.7	84±2
30	-29.8±3.8	-30.2±3.9	53±14	22.6±0.9	56±4	18.8±0.5	69±3	-37.3±7.9	-26.7	-	40±11	23.8±0.8	57±4	19.1±0.9	80±3
31	-27.3±1.6	-30.5±1.6	70±16	22.5±0.9	56±3	20.1±0.7	68±3	-41.7±7.9	-30.2	-	51±12	24.1±0.7	56±3	21.5±0.8	76±2
Mean	-22.3	-24.8	53	21.7	57	17.2	71	-31.1	-20.1	-	48	23.1	60	18.0	81
Std. Dev.	6.8	7.0	19	1.0	4	1.5	5	4.3	4.2	-	16	1.1	6	3.5	9
Min	-29.8	-31.7	26	19.7	50	14.5	64	-41.7	-32.2	-	22	20.2	51	9.3	70
Max	-4.0	-4.5	114	23.5	65	20.6	84	-23.4	-13.7	-	89	25.6	77	22.7	100

Table 2. Daily means (±SD) of environment data at Mt. Victory.

Day	Barn 1							Barn 2							
	Static Pressure		Ventilation	Cage (Center)		Exhaust Air (F38)		Static Pressure			Ventilation	Cage (Center)		Exhaust Air (F13)	
	East wall dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %	East wall dP, Pa	East curt. dP, Pa	West wall dP, Pa	Dry-STP, dsm^3/s	Temp., °C	RH, %	Temp., °C	RH, %
1	-29.4±2.1	-29.5±1.7	68±12	21.3±0.8	56±3	19.7±0.8	67±2	-40.0±5.3	-27.8	-	47±8	24.2±0.9	56±2	21.2±0.9	76±2
2	-28.4±1.8	-30.3±1.7	84±17	23.3±1.0	60±2	21.9±1.1	70±2	-46.1±13.6	-32.8	-	53±18	24.4±1.1	59±3	22.3±0.9	76±1
3	-28.5±2.0	-29.7±1.9	72±13	21.9±0.6	60±3	20.8±0.9	68±2	-27.4±9.6	-18.2	-	32±13	22.7±1.3	59±3	19.9±1.5	77±3
4	-28.8±2.8	-28.6±2.5	60±13	21.2±0.5	57±3	19.2±0.6	68±3	-37.3±5.6	-24.7	-	42±9	23.3±0.4	58±3	20.2±0.3	80±2
5	-31.0±5.7	-25.8±3.5	55±15	20.9±0.5	56±3	18.0±0.3	67±2	-35.2±5.7	-23.9	-	36±7	22.3±0.8	60±4	19.6±0.3	81±3
6	-26.3±4.1	-30.6±5.9	53±15	21.0±0.6	55±3	18.3±0.5	67±2	-33.3±7.0	-22.8	-	36±9	23.0±0.5	59±3	18.9±0.5	82±2
7	-28.6±4.6	-29.8±4.7	52±16	20.1±0.6	55±4	17.7±0.6	67±2	-34.7±6.8	-22.5	-	34±7	23.0±0.5	59±3	17.9±0.5	83±1
8	-28.1±3.5	-30.1±4.0	54±16	21.2±0.3	56±3	17.9±0.3	67±2	-34.8±6.4	-23	-	37±9	23.5±0.5	57±4	17.8±0.9	82±2
9	-28.9±3.0	-30.2±3.1	58±14	21.2±0.5	55±2	19.0±1.0	67±2	-38.0±5.4	-25	-	41±9	23.5±0.4	54±4	18.1±1.5	79±5
10	-28.2±2.8	-30.9±2.7	58±15	20.9±0.7	53±3	19.1±0.3	66±3	-36.8±5.1	-23.9	-	46±9	23.5±0.5	52±3	19.3±0.3	75±3
11	-30.6±2.7	-29.0±2.3	58±14	21.0±0.6	56±3	19.3±0.6	68±2	-36.9±5.5	-23.4	-	46±10	23.5±0.4	55±3	19.7±0.5	76±2
12	-28.2±1.9	-29.5±1.8	104±40	23.9±1.5	59±4	-	-	-43.8±8.3	-31.4	-	75±20	24.7±0.8	58±3	22.8±1.4	73±3
13	-28.5±2.4	-30.6±4.4	87±24	23.5±1.8	54±2	-	-	-36.1±6.6	-23.3	-	72±17	24.2±0.6	56±3	22.6±1.2	70±4
14	-27.0±5.0	-32.0±5.3	51±21	19.8±0.7	54±5	-	-	-26.0±4.8	-13.7	-	36±10	22.9±0.4	59±4	17.9±1.2	80±2
15	-26.7±5.8	-29.3±5.7	47±19	19.7±0.4	57±5	-	-	-26.2±4.8	-14	-	33±9	22.7±0.8	60±4	15.6±0.4	83±2
16	-26.1±5.9	-30.3±6.3	46±18	19.5±0.7	59±5	-	-	-26.3±5.2	-13.5	-	32±9	22.9±0.4	62±5	14.7±0.8	85±2
17	-23.2±6.9	-28.7±7.8	41±17	21.4±1.3	62±5	-	-	-25.7±4.1	-14.4	-	32±8	24.0±0.7	67±4	13.5±1.0	89±3
18	-25.1±7.1	-25.7±6.8	36±15	21.3±2.1	62±5	-	-	-28.1±5.3	-14.5	-	33±15	24.0±0.5	68±3	11.9±2.2	91±4
19	-25.4±5.4	-29.2±6.2	48±21	20.5±0.4	57±4	-	-	-29.3±3.0	-14.8	-	40±12	24.5±0.8	62±2	16.7±1.8	85±3
20	-26.9±6.1	-27.7±5.7	46±20	20.3±0.5	57±5	-	-	-29.6±4.0	-15.3	-	34±8	24.3±0.3	63±5	16.9±0.6	85±3
21	-27.2±6.6	-26.6±6.4	41±17	19.8±0.8	60±5	-	-	-29.0±3.7	-15.6	-	33±8	23.9±0.2	67±5	15.7±0.8	87±3
22	-26.5±6.2	-29.2±8.0	42±17	19.2±0.5	59±4	-	-	-29.8±3.6	-15.6	-	-	24.2±0.3	67±3	16.3±0.8	88±2
23	-23.8±6.1	-26.9±7.5	42±25	18.6±1.5	56±7	11.9±0.8	77±6	-26.5±3.5	-14.5	-	-	24.1±0.4	72±3	14.4±1.1	90±3
24	-21.2±9.0	-23.5±8.5	38±33	19.9±2.5	55±8	13.6±1.4	74±6	-29.2±3.9	-15.6	-	-	25.0±1.0	69±2	14.6±2.1	92±3
25	-25.1±4.8	-26.1±4.4	43±19	21.9±0.4	54±4	16.8±1.4	69±6	-33.0±7.9	-19.7	-	43±11	24.0±1.2	61±3	16.8±0.9	84±4
26	-25.1±4.8	-28.2±5.3	48±20	21.7±0.8	53±5	17.6±1.3	69±6	-35.8±10.4	-22.6	-	47±10	23.4±0.7	61±7	15.2±2.1	82±6
27	-24.5±6.7	-23.6±7.6	37±18	20.5±0.6	61±5	13.7±0.6	82±4	-31.5±10.1	-20.5	-	34±11	24.6±0.5	71±4	-	-
28	-26.2±7.4	-24.3±6.9	38±16	20.6±0.9	59±5	13.6±1.6	79±8	-24.2±12.9	-13.4	-	38±18	25.2±0.5	69±4	-	-
29	-27.0±5.6	-27.0±5.6	42±18	20.5±0.7	56±2	15.9±1.1	71±3	-14.9±8.0	-1.9	-	47±22	24.3±0.7	63±4	-	-
30	-26.0±4.5	-27.4±5.2	43±18	20.3±0.6	56±2	16.3±0.9	72±3	-16.7±7.9	-3.1	-	47±22	23.6±0.4	62±4	-	-
31	-26.0±5.6	-26.3±6.1	32±13	-	-	14.8±0.4	71±6	-16.3±8.6	-3.1	-	30±13	23.8±0.6	66±4	-	-
Mean	-26.8	-28.3	52	20.9	57	17.3	70	-30.9	-18.3	-	41	23.8	62	17.7	82
Std. Dev.	2.1	2.2	16	1.2	3	2.6	4	7.2	7.3	-	11	0.7	5	2.8	6
Min	-31.0	-32.0	32	18.6	53	11.9	66	-46.1	-32.8	-	30	22.3	52	11.9	70
Max	-21.2	-23.5	104	23.9	62	21.9	82	-14.9	-1.9	-	75	25.2	72	22.8	92

August-04

Day	Ambient, µg/dsm^3		Barn 1 Exhaust, µg/dsm^3		Barn 2 Untreated (Center), µg/dsm^3		Barn 2 Treated (Exhaust), µg/dsm^3 East wall		Barn 2 Treated (Exhaust), µg/dsm^3 West wall	
	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
1	-	-	272±126	804	730±145	1605	516±107	844	631±103	966
2	-	-	256±110	499	727±130	1300	531±100	1057	627±206	2908
3	-	-	254±115	831	671±199	1712	499±160	1128	596±142	1127
4	-	-	287±163	710	627±391	3719	410±156	740	579±185	998
5	-	-	367±191	735	522±182	1119	340±112	715	375±110	711
6	-	-	268±181	1440	587±366	1798	336±224	1309	305±150	738
7	-	-	368±291	1949	854±698	9313	490±204	2564	412±225	1493
8	-	-	354±165	712	646±288	1702	404±185	890	560±244	1304
9	-	-	340±140	807	820±255	1773	500±150	1001	572±199	1189
10	-	-	281±135	675	554±295	1614	353±179	914	500±255	1123
11	-	-	318±171	1329	686±355	1792	455±233	1106	475±297	1581
12	-	-	411±180	914	657±322	1661	466±215	1307	309±332	1466
13	-	-	466±235	970	874±499	4155	544±263	1226	361±643	5533
14	-	-	427±184	1206	940±454	2861	586±265	1409	470±502	1987
15	-	-	338±129	705	946±475	4001	579±261	1441	462±457	2230
16	-	-	343±158	722	830±375	2070	519±224	1201	467±678	3186
17	-	-	300±142	644	827±446	2253	498±266	1387	264±277	1203
18	-	-	373±242	1097	790±471	2000	508±409	3812	443±351	5276
19	-	-	410±240	1248	715±433	2275	479±292	1016	562±341	1207
20	-	-	315±209	1092	629±405	1684	423±281	2215	481±267	1078
21	-	-	344±178	842	453±240	1022	273±139	576	326±143	787
22	-	-	391±169	767	480±266	1287	284±160	749	421±261	1257
23	-	-	420±215	963	672±344	1743	442±229	969	447±300	1165
24	-	-	356±181	799	585±315	1160	358±191	703	347±193	775
25	-	-	287±178	706	414±318	1134	252±194	763	250±192	1001
26	-	-	334±169	717	478±289	1048	329±213	1539	341±189	865
27	-	-	244±135	735	508±325	1187	309±199	701	336±209	942
28	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-
Mean	-	-	338	912	675	2185	433	1233	442	1633
Std. Dev.	-	-	58	303	147	1629	95	671	110	1222
Min	-	-	244	499	414	1022	252	576	250	711
Max	-	-	466	1949	946	9313	586	3812	631	5533

Table 3. Daily means (±SD) of PM_{10} concentrations at Mt. Victory.

Day	September-04									
			Barn 1				Barn 2			
	Ambient, μg/dsm^3		Exhaust, μg/dsm^3		Untreated (Center), μg/dsm^3		Treated (Exhaust), μg/dsm^3			
							East wall		West wall	
	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
1	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	434±274	1342	-	-	-	-
13	-	-	-	-	451±311	1227	-	-	-	-
14	-	-	-	-	429±253	1423	-	-	-	-
15	-	-	367±193	1941	384±220	836	199±130	584	260±148	759
16	-	-	335±177	874	345±231	944	207±144	538	256±189	708
17	-	-	417±208	886	389±290	1236	222±139	924	341±231	1046
18	-	-	403±164	1010	468±252	1099	256±121	850	-	-
19	-	-	399±160	880	462±249	1020	242±122	532	-	-
20	-	-	467±205	1077	451±256	1133	233±116	520	-	-
21	-	-	472±205	1121	473±266	1116	244±113	508	-	-
22	-	-	500±231	1522	461±349	1911	259±172	1353	-	-
23	-	-	452±217	1147	435±251	1127	234±124	627	379±201	935
24	-	-	505±226	1334	453±280	1072	243±136	511	367±197	884
25	-	-	486±218	1264	431±248	1082	218±114	516	269±125	731
26	-	-	522±229	1964	528±250	1404	234±100	686	-	-
27	-	-	481±290	1566	387±235	990	185±100	428	-	-
28	-	-	514±257	1349	449±286	1105	224±129	568	-	-
29	-	-	536±349	1787	463±312	1518	218±126	626	-	-
30	-	-	497±294	1411	451±289	1178	222±123	590	-	-
Mean	-	-	459	1321	439	1198	228	648	312	844
Std. Dev.	-	-	57	348	39	236	19	220	52	122
Min	-	-	335	874	345	836	185	428	256	708
Max	-	-	536	1964	528	1911	259	1353	379	1046

Table 3. Daily means (±SD) of PM_{10} concentrations at Mt. Victory.

Day	Ambient, µg/dsm³		Barn 1 Exhaust, µg/dsm³		Barn 2 Untreated (Center), µg/dsm³		Barn 2 Treated (Exhaust), µg/dsm³ East wall		Barn 2 Treated (Exhaust), µg/dsm³ West wall	
October-04	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
1	-	-	512±287	1300	466±309	1407	245±146	688	-	-
2	-	-	445±212	1035	-	-	-	-	-	-
3	-	-	468±296	1437	396±283	1307	245±169	865	-	-
4	-	-	490±335	1322	417±311	1478	238±160	771	-	-
5	-	-	561±214	1079	518±330	1261	333±205	973	-	-
6	-	-	558±248	1216	404±320	1457	266±206	979	-	-
7	-	-	510±285	2073	402±366	3068	284±234	1359	-	-
8	-	-	463±216	1096	445±286	1175	305±183	815	-	-
9	-	-	444±193	883	491±295	1042	282±132	661	-	-
10	-	-	479±209	1180	460±257	1002	306±182	739	-	-
11	-	-	620±322	1505	524±326	1271	346±208	817	-	-
12	-	-	510±235	1254	549±322	1239	337±192	754	-	-
13	-	-	563±270	1422	571±326	1153	368±199	818	-	-
14	-	-	473±209	1164	554±351	1816	327±200	1121	-	-
15	-	-	555±333	1328	531±373	1510	363±248	953	-	-
16	-	-	533±309	1328	574±407	1532	358±250	914	-	-
17	-	-	590±350	1481	515±370	1405	302±216	810	-	-
18	-	-	650±404	1868	487±339	1899	302±211	1244	-	-
19	-	-	469±262	1268	593±451	3216	367±263	1682	-	-
20	-	-	504±285	1269	444±316	1494	268±197	996	-	-
21	-	-	480±194	1149	537±510	4594	310±225	839	-	-
22	-	-	482±188	976	517±307	1395	322±189	925	-	-
23	-	-	417±182	776	289±275	874	223±129	508	-	-
24	-	-	458±209	1070	339±290	890	199±117	521	-	-
25	-	-	528±296	1650	175±259	922	276±180	848	-	-
26	-	-	499±235	1423	335±294	1988	303±220	1210	-	-
27	-	-	515±337	1748	359±322	1491	242±137	792	-	-
28	-	-	514±247	1500	532±408	2809	339±231	1561	-	-
29	-	-	-	-	-	-	-	-	-	-
30	-	-	404±230	1284	360±259	1157	199±126	681	-	-
31	-	-	484±254	1140	652±416	1553	437±256	1041	-	-
Mean	-	-	506	1308	463	1635	300	927	-	-
Std. Dev.	-	-	55	275	102	805	54	269	-	-
Min	-	-	404	776	175	874	199	508	-	-
Max	-	-	650	2073	652	4594	437	1682	-	-

Table 3. Daily means (±SD) of PM_{10} concentrations at Mt. Victory.

Day	Ambient, μg/dsm^3		Barn 1 Exhaust, μg/dsm^3		Barn 1 Untreated (Center), μg/dsm^3		Barn 2 Treated (Exhaust), μg/dsm^3 East wall		Barn 2 Treated (Exhaust), μg/dsm^3 West wall	
	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
1	-	-	596±347	1406	609±463	1667	386±261	1023	-	-
2	-	-	407±190	951	433±319	1201	239±169	812	-	-
3	-	-	574±379	1607	654±546	2035	426±312	1287	-	-
4	-	-	498±203	1172	567±418	1400	369±251	907	-	-
5	-	-	637±345	1426	567±471	1921	350±260	1128	-	-
6	-	-	480±202	1017	446±324	1225	275±183	708	-	-
7	-	-	464±210	1145	361±338	1487	242±202	1069	-	-
8	-	-	670±401	2052	565±518	1968	367±293	1069	-	-
9	-	-	-	-	-	-	-	-	-	-
10	-	-	627±352	1636	385±527	6057	236±287	1367	-	-
11	-	-	588±257	1125	384±215	720	281±154	515	-	-
12	-	-	630±372	1520	378±284	1090	266±170	601	-	-
13	-	-	590±275	1374	344±205	1011	280±163	764	-	-
14	-	-	549±274	1179	354±219	791	246±148	569	-	-
15	-	-	609±440	2467	399±288	1173	250±163	703	-	-
16	-	-	493±237	1271	345±186	702	213±115	489	-	-
17	-	-	608±382	2019	353±241	1114	189±138	1090	-	-
18	-	-	367±192	1311	323±180	1018	146±85	661	-	-
19	-	-	403±269	1065	355±218	1218	142±89	470	-	-
20	-	-	400±198	861	413±250	875	160±87	360	-	-
21	-	-	382±210	991	306±210	795	185±121	470	-	-
22	-	-	623±401	1904	379±302	1724	219±160	657	-	-
23	-	-	512±336	1454	423±284	1131	174±117	514	-	-
24	-	-	597±586	2857	379±313	1276	165±154	815	-	-
25	-	-	494±271	1225	398±296	1178	240±162	726	-	-
26	-	-	419±246	1208	319±384	1752	147±207	959	-	-
27	-	-	471±205	915	391±320	1422	142±141	593	-	-
28	-	-	560±263	1159	423±567	1952	170±249	883	-	-
29	-	-	656±454	3598	393±647	2845	197±318	1303	-	-
30	-	-	635±308	1431	495±656	2574	220±317	1187	-	-
Mean	-	-	536	1495	419	1563	239	817	-	-
Std. Dev.	-	-	91	603	89	995	77	279	-	-
Min	-	-	367	861	306	702	142	360	-	-
Max	-	-	670	3598	654	6057	426	1367	-	-

November-04

Table 3. Daily means (±SD) of PM_{10} concentrations at Mt. Victory.

December-04										
Day			Barn 1				Barn 2			
	Ambient, µg/dsm³		Exhaust, µg/dsm³		Untreated (Center), µg/dsm³		Treated (Exhaust), µg/dsm³			
							East wall		West wall	
	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
1	-	-	701±550	2690	476±814	2925	231±383	1622	-	-
2	-	-	774±422	2233	439±711	2089	195±314	1042	-	-
3	-	-	749±693	4238	455±824	5808	207±331	1258	-	-
4	-	-	734±517	2218	397±874	3160	172±392	1258	-	-
5	-	-	714±456	2120	369±869	2602	134±381	1090	-	-
6	-	-	702±481	2016	345±560	2495	132±266	1249	-	-
7	-	-	615±341	1544	353±364	2258	124±160	776	-	-
8	-	-	-	-	398±548	2189	167±235	902	-	-
9	-	-	-	-	403±214	1009	140±71	402	-	-
10	-	-	-	-	373±227	1497	144±94	398	-	-
11	-	-	865±456	1876	384±227	1169	159±84	361	-	-
12	-	-	753±472	2109	361±206	785	159±82	343	-	-
13	-	-	1001±738	4741	388±270	2287	205±123	522	-	-
14	-	-	963±574	2413	352±177	655	185±91	413	-	-
15	-	-	-	-	334±164	798	198±99	464	-	-
16	32±28	183	-	-	341±165	793	228±86	554	-	-
17	72±76	318	-	-	357±267	3167	219±138	701	-	-
18	41±29	150	741±341	1610	432±279	1260	209±109	522	-	-
19	22±41	245	700±444	3996	381±286	1566	177±171	1215	-	-
20	11±37	155	697±461	2659	231±281	4579	-	-	-	-
21	43±18	81	590±326	1652	408±258	1039	219±204	1047	-	-
22	72±41	186	631±355	1446	442±298	2043	402±1219	9269	-	-
23	44±28	113	617±198	1067	565±279	1242	516±1119	9265	-	-
24	30±13	74	547±193	1109	331±210	878	239±1387	9231	-	-
25	-	-	583±256	1060	214±165	701	153±1008	9214	-	-
26	101±44	199	705±395	2861	534±335	3015	296±1156	9251	-	-
27	35±29	258	612±293	2040	600±282	1732	263±416	4444	-	-
28	49±14	87	695±406	3011	814±502	1954	240±804	9240	-	-
29	67±31	182	740±358	1593	818±423	1762	380±308	1134	-	-
30	62±29	139	744±346	1769	932±466	2027	474±206	929	-	-
31	45±15	82	768±415	2056	819±368	1634	435±223	1020	-	-
Mean	48	163	718	2245	453	1971	233	2638	-	-
Std. Dev.	22	70	105	929	171	1137	103	3381	-	-
Min	11	74	547	1060	214	655	124	343	-	-
Max	101	318	1001	4741	932	5808	516	9269	-	-

Table 3. Daily means (±SD) of PM_{10} concentrations at Mt. Victory.

Day	January-05									
			Barn 1		Barn 2					
	Ambient, μg/dsm³		Exhaust, μg/dsm³		Untreated (Center), μg/dsm³		Treated (Exhaust), μg/dsm³			
							East wall		West wall	
	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
1	160±87	309	798±379	2378	723±334	1949	387±159	663	-	-
2	44±21	100	632±263	1422	542±298	1585	223±120	885	-	-
3	97±63	257	838±555	2367	467±252	1041	311±183	949	-	-
4	107±56	226	886±461	2016	593±319	1723	325±159	785	-	-
5	47±34	150	911±521	2039	676±381	1767	347±205	880	-	-
6	50±29	158	907±413	2009	679±373	1611	302±158	1030	-	-
7	37±16	101	949±527	2309	579±339	1755	301±186	873	-	-
8	90±53	237	961±485	2603	571±403	2074	356±192	868	-	-
9	39±14	74	782±378	1612	545±403	2387	310±186	750	-	-
10	82±50	219	891±511	2131	715±524	3874	358±203	707	-	-
11	68±48	218	847±356	1590	764±437	1717	315±138	602	-	-
12	42±20	95	-	-	518±324	1217	220±109	847	-	-
13	-	-	-	-	558±372	1828	279±314	4585	-	-
14	-	-	-	-	488±305	1447	334±189	867	-	-
15	-	-	-	-	474±284	1207	279±236	903	-	-
16	-	-	-	-	423±243	1046	302±256	883	-	-
17	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-
23	-	-	766±380	1648	-	-	-	-	-	-
24	-	-	784±623	2304	-	-	-	-	-	-
25	-	-	1026±420	2138	-	-	-	-	-	-
26	-	-	901±472	2985	-	-	-	-	-	-
27	-	-	738±370	1499	-	-	-	-	-	-
28	-	-	980±754	3545	-	-	-	-	-	-
29	-	-	1157±601	2439	-	-	-	-	-	-
30	-	-	978±496	2273	-	-	-	-	-	-
31	-	-	1162±670	2962	-	-	-	-	-	-
Mean	72	179	895	2213	582	1764	309	1067	-	-
Std. Dev.	36	73	128	526	99	651	43	914	-	-
Min	37	74	632	1422	423	1041	220	602	-	-
Max	160	309	1162	3545	764	3874	387	4585	-	-

Table 4. Daily means (±SD) of PM_{10} emission rates at Mt. Victory.

Day	Barn 1				Barn 2							
	Gross Emission Rate				Untreated Gross Emission Rate				Treated Gross Emission Rate			
	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU
August-04												
1	-	-	-	-	21.0±4.2	5.0±1.0	128.1±25.4	52.9±10.5	16.3±2.9	3.9±0.7	99.3±17.8	41.0±7.3
2	-	-	-	-	20.5±3.6	4.9±0.9	125.3±22.2	51.5±9.1	16.2±3.6	3.9±0.9	98.6±22.0	40.5±9.0
3	-	-	-	-	18.5±5.4	4.4±1.3	113.0±32.7	46.1±13.4	14.9±3.8	3.6±0.9	91.0±23.3	37.2±9.5
4	-	-	-	-	17.6±11.3	4.2±2.7	107.5±69.2	43.7±28.1	13.5±4.7	3.2±1.1	82.1±28.4	33.3±11.5
5	-	-	-	-	13.5±4.8	3.3±1.1	82.7±29.2	33.4±11.8	9.2±2.9	2.2±0.7	56.0±17.5	22.6±7.1
6	-	-	-	-	12.8±6.6	3.1±1.6	78.1±40.1	31.4±16.1	7.4±3.6	1.8±0.9	45.3±22.1	18.2±8.9
7	10.7±9.4	2.6±2.2	62.3±54.6	19.4±17.0	18.7±17.8	4.5±4.3	114.0±108.8	45.6±43.5	11.1±4.9	2.7±1.2	67.9±29.9	27.2±11.9
8	10.6±5.5	2.5±1.3	61.8±31.9	19.2±9.9	17.7±9.1	4.2±2.2	107.9±55.5	42.9±22.0	13.0±6.7	3.1±1.6	79.1±40.9	31.5±16.2
9	9.1±4.3	2.2±1.0	52.9±25.1	16.4±7.8	19.4±4.4	4.7±1.0	118.6±26.7	46.9±10.6	13.4±3.3	3.2±0.8	81.7±20.4	32.3±8.1
10	8.7±4.5	2.1±1.1	50.7±26.1	15.7±8.1	14.9±7.7	3.6±1.8	91.1±47.0	35.9±18.5	11.3±5.5	2.7±1.3	68.7±33.5	27.1±13.2
11	7.9±5.7	1.9±1.4	46.4±33.1	14.3±10.2	14.3±6.3	3.4±1.5	87.3±38.2	34.2±15.0	10.2±4.1	2.4±1.0	62.1±25.0	24.3±9.8
12	7.9±4.7	1.9±1.1	46.0±27.4	14.2±8.4	12.8±7.2	3.1±1.7	78.3±43.9	30.5±17.1	9.3±4.9	2.2±1.2	56.8±30.2	22.1±11.8
13	9.7±7.3	2.3±1.8	56.7±42.5	17.4±13.1	17.3±11.9	4.2±2.9	105.7±72.9	41.0±28.2	10.3±7.8	2.5±1.9	62.7±47.6	24.3±18.5
14	8.2±5.1	2.0±1.2	47.9±29.8	14.7±9.1	19.9±10.3	4.8±2.5	121.4±63.0	46.8±24.3	13.1±7.4	3.1±1.8	80.0±44.9	30.9±17.3
15	5.1±3.0	1.2±0.7	29.9±17.6	9.1±5.4	21.2±11.2	5.1±2.7	129.7±68.7	49.8±26.4	12.2±5.9	2.9±1.4	74.8±36.3	28.7±14.0
16	6.9±4.8	1.7±1.2	40.6±28.2	12.4±8.6	18.2±8.9	4.4±2.1	111.6±54.7	42.6±20.9	11.3±7.5	2.7±1.8	69.3±45.9	26.5±17.5
17	6.6±4.3	1.6±1.0	38.6±25.0	11.7±7.6	18.8±10.2	4.5±2.4	115.1±62.3	43.8±23.7	10.0±5.0	2.4±1.2	61.4±30.9	23.3±11.7
18	9.5±6.9	2.3±1.7	55.5±40.4	16.8±12.2	20.4±12.3	4.9±3.0	124.9±75.3	47.2±28.5	12.2±8.6	2.9±2.1	74.7±52.4	28.2±19.8
19	10.5±6.0	2.5±1.4	61.6±35.0	18.6±10.6	18.1±11.5	4.3±2.8	110.6±70.7	41.7±26.6	12.9±8.1	3.1±1.9	79.1±49.2	29.8±18.5
20	6.0±3.9	1.5±0.9	35.3±23.0	10.7±6.9	16.6±10.7	4.0±2.6	101.7±65.8	38.1±24.6	11.8±7.1	2.8±1.7	72.1±43.2	27.0±16.2
21	6.5±4.7	1.6±1.1	38.3±27.6	11.5±8.3	11.4±6.2	2.7±1.5	70.0±37.8	26.1±14.1	7.5±3.6	1.8±0.9	45.8±21.9	17.1±8.2
22	8.2±5.6	2.0±1.4	48.2±33.0	14.5±9.9	10.6±6.3	2.5±1.5	64.9±38.6	24.1±14.3	7.8±4.8	1.9±1.2	47.6±29.5	17.7±10.9
23	10.3±6.7	2.5±1.6	60.3±39.0	18.0±11.7	13.8±8.5	3.3±2.0	84.2±52.0	31.1±19.2	9.5±6.0	2.3±1.4	58.4±36.4	21.6±13.4
24	9.6±5.0	2.3±1.2	56.4±29.0	16.8±8.7	11.9±7.0	2.8±1.7	72.6±42.9	26.7±15.8	7.3±4.1	1.7±1.0	44.4±25.0	16.3±9.2
25	7.8±4.9	1.9±1.2	45.8±28.6	13.6±8.5	8.6±6.7	2.1±1.6	52.8±40.9	19.3±15.0	5.3±4.1	1.3±1.0	32.2±25.2	11.8±9.2
26	9.1±4.6	2.2±1.1	53.6±27.0	15.9±8.0	10.5±6.3	2.5±1.5	64.5±38.9	23.5±14.1	7.4±4.3	1.8±1.0	45.2±26.5	16.5±9.7
27	6.7±3.7	1.6±0.9	39.6±21.8	11.7±6.5	11.2±7.1	2.7±1.7	68.4±43.4	24.8±15.7	7.1±4.4	1.7±1.1	43.4±26.9	15.7±9.8
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-
Mean	8.4	2	49	14.9	15.9	3.8	97.4	37.8	10.8	2.6	65.9	25.7
Std. Dev.	1.6	0.4	9.2	2.9	3.7	0.9	22.5	9.5	2.8	0.7	17.3	7.4
Min	5.1	1.2	29.9	9.1	8.6	2.1	52.8	19.3	5.3	1.3	32.2	11.8
Max	10.7	2.6	62.3	19.4	21.2	5.1	129.7	52.9	16.3	3.9	99.3	41

Table 4. Daily means (±SD) of PM_{10} emission rates at Mt. Victory.

Day	September-04											
	Barn 1				Barn 2							
	Gross Emission Rate				Untreated Gross Emission Rate				Treated Gross Emission Rate			
	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-
15	8.3±6.0	2.0±1.4	49.1±35.5	14.7±10.6	8.0±4.8	1.9±1.2	48.8±29.7	17.0±10.3	4.7±3.0	1.1±0.7	28.7±18.3	10.0±6.4
16	8.8±5.8	2.1±1.4	51.7±34.2	15.5±10.2	7.8±5.2	1.9±1.3	47.6±32.1	16.5±11.1	5.0±3.6	1.2±0.9	30.5±22.3	10.6±7.7
17	5.4±3.0	1.3±0.7	31.8±17.5	9.5±5.2	6.7±5.2	1.6±1.3	41.0±32.2	14.2±11.2	4.1±3.0	1.0±0.7	25.1±18.2	8.7±6.3
18	5.7±3.7	1.4±0.9	33.5±21.8	10.0±6.5	7.4±5.0	1.8±1.2	45.5±30.6	15.7±10.6	4.8±3.9	1.2±0.9	29.5±24.2	10.2±8.4
19	6.0±4.0	1.4±1.0	35.2±23.5	10.5±7.0	7.6±5.0	1.8±1.2	46.4±30.6	16.1±10.6	4.6±3.3	1.1±0.8	28.3±20.0	9.8±6.9
20	8.3±7.0	2.0±1.7	49.1±41.3	14.7±12.3	7.1±5.1	1.7±1.2	43.5±31.1	15.0±10.7	4.4±3.4	1.1±0.8	27.1±21.1	9.3±7.3
21	8.4±5.4	2.0±1.3	49.4±31.8	14.7±9.5	8.3±5.5	2.0±1.3	51.0±34.0	17.6±11.7	5.4±3.9	1.3±0.9	33.4±24.1	11.5±8.3
22	11.3±8.3	2.7±2.0	67.1±49.3	20.0±14.7	8.1±6.1	2.0±1.5	50.0±37.5	17.2±12.9	5.4±4.1	1.3±1.0	33.3±25.3	11.5±8.7
23	9.1±4.8	2.2±1.2	54.1±28.4	16.1±8.5	8.5±5.3	2.0±1.3	52.3±32.8	18.0±11.3	5.4±3.4	1.3±0.8	33.3±20.6	11.5±7.1
24	11.9±7.8	2.8±1.9	70.1±46.1	20.8±13.7	9.5±6.5	2.3±1.6	58.1±39.8	19.9±13.7	6.0±3.9	1.4±0.9	36.8±24.1	12.6±8.3
25	9.9±5.4	2.4±1.3	58.8±31.7	17.5±9.4	9.7±5.9	2.3±1.4	59.4±36.5	20.4±12.5	5.2±2.9	1.3±0.7	32.1±18.0	11.0±6.2
26	6.9±3.5	1.7±0.8	41.1±20.5	12.2±6.1	9.3±4.9	2.2±1.2	57.0±30.3	19.5±10.4	4.3±2.3	1.0±0.6	26.7±14.2	9.1±4.8
27	8.1±5.7	2.0±1.4	48.2±33.8	14.3±10.0	7.1±4.9	1.7±1.2	43.8±30.0	15.0±10.3	3.7±2.5	0.9±0.6	22.5±15.1	7.7±5.2
28	7.5±4.6	1.8±1.1	44.7±27.5	13.2±8.1	7.8±5.6	1.9±1.4	47.9±34.6	16.3±11.8	4.2±3.2	1.0±0.8	25.9±19.6	8.8±6.7
29	5.3±3.8	1.3±0.9	31.7±22.6	9.4±6.7	6.1±4.7	1.5±1.1	37.6±29.1	12.8±9.9	2.9±2.1	0.7±0.5	17.5±12.9	6.0±4.4
30	5.3±3.7	1.3±0.9	31.6±22.2	9.3±6.6	6.8±5.2	1.6±1.2	41.9±31.9	14.3±10.9	3.7±2.9	0.9±0.7	22.4±17.5	7.6±6.0
Mean	7.9	1.9	46.7	13.9	7.9	1.9	48.2	16.6	4.6	1.1	28.3	9.7
Std. Dev.	2	0.5	11.8	3.5	1	0.2	6	2.1	0.8	0.2	4.8	1.7
Min	5.3	1.3	31.6	9.3	6.1	1.5	37.6	12.8	2.9	0.7	17.5	6
Max	11.9	2.8	70.1	20.8	9.7	2.3	59.4	20.4	6	1.4	36.8	12.6

Table 4. Daily means (±SD) of PM_{10} emission rates at Mt. Victory.

Day	October-04											
	Barn 1				Barn 2							
	Gross Emission Rate				Untreated Gross Emission Rate				Treated Gross Emission Rate			
	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU
1	8.3±8.0	2.0±1.9	49.3±47.2	14.6±13.9	7.0±5.6	1.7±1.3	42.8±34.3	14.5±11.7	3.9±3.0	0.9±0.7	24.2±18.2	8.2±6.2
2	5.4±2.9	1.3±0.7	32.1±17.5	9.5±5.1	-	-	-	-	4.3±2.4	1.0±0.6	26.5±14.8	9.0±5.0
3	3.5±2.9	0.8±0.7	20.6±17.5	6.1±5.1	4.2±3.5	1.0±0.9	25.8±21.7	8.7±7.4	2.6±1.9	0.6±0.5	15.7±12.0	5.3±4.1
4	4.8±3.9	1.1±0.9	28.4±22.9	8.4±6.7	5.1±4.3	1.2±1.0	31.2±26.7	10.6±9.0	2.9±2.3	0.7±0.5	17.7±14.0	6.0±4.7
5	4.4±2.3	1.1±0.6	26.2±13.9	7.7±4.1	4.6±3.9	1.1±0.9	28.2±23.7	9.5±8.0	2.8±2.0	0.7±0.5	17.2±12.6	5.8±4.2
6	6.3±4.8	1.5±1.2	37.2±28.8	10.9±8.5	4.6±3.7	1.1±0.9	28.3±22.8	9.5±7.7	3.2±2.4	0.8±0.6	19.4±14.5	6.6±4.9
7	6.3±3.7	1.5±0.9	37.3±22.3	10.9±6.5	4.3±3.8	1.0±0.9	26.7±23.5	9.0±7.9	3.1±2.1	0.7±0.5	19.0±12.8	6.4±4.3
8	8.4±7.2	2.0±1.7	50.2±42.6	14.7±12.5	5.8±5.1	1.4±1.2	35.5±31.3	12.0±10.6	3.7±3.0	0.9±0.7	22.5±18.3	7.6±6.1
9	7.4±3.8	1.8±0.9	43.8±22.8	12.8±6.7	6.2±4.1	1.5±1.0	38.2±25.3	12.8±8.5	3.5±1.9	0.8±0.5	21.4±11.8	7.2±4.0
10	4.7±2.5	1.1±0.6	27.8±15.0	8.1±4.4	3.7±2.5	0.9±0.6	23.0±15.7	7.7±5.3	2.3±1.4	0.6±0.3	14.3±8.4	4.8±2.8
11	5.8±4.4	1.4±1.1	34.6±26.4	10.1±7.7	3.9±3.1	0.9±0.8	24.0±19.3	8.1±6.5	2.4±1.8	0.6±0.4	15.0±11.1	5.0±3.7
12	4.4±2.7	1.1±0.6	26.3±16.1	7.7±4.7	4.0±2.9	1.0±0.7	24.5±17.6	8.2±5.9	2.3±1.5	0.6±0.4	14.4±9.1	4.8±3.1
13	4.5±2.6	1.1±0.6	26.8±15.3	7.8±4.4	3.7±2.4	0.9±0.6	22.6±14.9	7.5±5.0	2.4±1.5	0.6±0.4	14.5±9.0	4.8±3.0
14	7.1±5.8	1.7±1.4	42.5±34.4	12.4±10.0	4.1±3.9	1.0±0.9	25.4±23.8	8.5±8.0	2.4±2.2	0.6±0.5	14.8±13.3	4.9±4.4
15	4.0±2.6	1.0±0.6	23.8±15.3	6.9±4.4	2.6±1.8	0.6±0.4	15.8±11.4	5.3±3.8	1.8±1.2	0.4±0.3	10.8±7.6	3.6±2.5
16	3.4±2.4	0.8±0.6	20.0±14.3	5.8±4.2	2.8±2.0	0.7±0.5	17.0±12.1	5.7±4.0	1.7±1.2	0.4±0.3	10.6±7.4	3.5±2.5
17	3.6±2.5	0.9±0.6	21.2±14.9	6.2±4.3	2.5±1.9	0.6±0.4	15.6±11.4	5.2±3.8	1.5±1.1	0.4±0.3	9.1±6.6	3.0±2.2
18	3.6±2.5	0.9±0.6	21.5±15.0	6.2±4.4	2.3±1.6	0.6±0.4	14.4±9.8	4.8±3.2	1.5±1.0	0.4±0.2	9.0±6.2	3.0±2.1
19	3.4±2.2	0.8±0.5	20.1±13.0	5.8±3.8	3.3±2.6	0.8±0.6	20.3±15.9	6.7±5.3	2.0±1.4	0.5±0.3	12.3±8.7	4.1±2.9
20	3.4±2.2	0.8±0.5	20.4±13.1	5.9±3.8	3.1±2.3	0.7±0.6	18.9±14.2	6.2±4.7	1.9±1.5	0.5±0.4	11.6±9.4	3.9±3.1
21	3.9±2.0	0.9±0.5	23.0±12.2	6.7±3.5	5.7±6.1	1.4±1.5	35.2±37.4	11.6±12.4	3.4±4.1	0.8±1.0	21.0±25.5	6.9±8.4
22	3.8±2.0	0.9±0.5	22.7±12.0	6.6±3.5	3.6±2.3	0.9±0.6	22.0±14.4	7.3±4.8	2.2±1.5	0.5±0.4	13.5±9.5	4.5±3.1
23	4.0±2.2	1.0±0.5	24.0±13.2	7.0±3.8	2.5±2.6	0.6±0.6	15.5±16.0	5.1±5.3	1.8±1.1	0.4±0.3	10.8±6.9	3.6±2.3
24	5.0±2.7	1.2±0.7	29.8±16.4	8.7±4.8	3.4±3.0	0.8±0.7	20.7±18.5	6.9±6.2	1.9±1.3	0.5±0.3	11.5±7.7	3.8±2.6
25	5.5±3.7	1.3±0.9	33.0±22.5	9.6±6.6	1.9±2.5	0.5±0.6	11.8±15.5	4.0±5.2	2.5±1.8	0.6±0.4	15.2±10.8	5.1±3.6
26	5.7±3.2	1.4±0.8	34.0±19.4	10.0±5.7	3.4±2.9	0.8±0.7	20.8±18.0	7.0±6.0	2.8±1.7	0.7±0.4	17.5±10.7	5.9±3.6
27	6.0±4.2	1.4±1.0	36.0±25.5	10.6±7.5	4.2±4.6	1.0±1.1	25.6±28.1	8.6±9.5	2.6±1.6	0.6±0.4	15.7±10.0	5.3±3.4
28	5.4±3.0	1.3±0.7	32.3±18.2	9.5±5.4	4.8±3.7	1.2±0.9	29.5±22.8	10.0±7.7	2.9±1.9	0.7±0.4	18.0±11.5	6.1±3.9
29	-	-	-	-	-	-	-	-	-	-	-	-
30	9.0±5.7	2.2±1.4	54.1±34.1	16.1±10.1	5.8±4.2	1.4±1.0	35.4±25.7	12.1±8.8	3.2±2.0	0.8±0.5	19.6±12.4	6.7±4.2
31	4.3±2.5	1.0±0.6	25.9±14.9	7.7±4.4	4.7±3.2	1.1±0.8	29.2±19.9	10.0±6.8	3.1±1.9	0.7±0.5	19.1±11.9	6.5±4.1
Mean	5.2	1.2	30.8	9	4.1	1.0	25	8.4	2.6	0.6	16.1	5.4
Std. Dev.	1.6	0.4	9.4	2.8	1.2	0.3	7.5	2.6	0.7	0.2	4.4	1.5
Min	3.4	0.8	20	5.8	1.9	0.5	11.8	4	1.5	0.4	9	3
Max	9	2.2	54.1	16.1	7	1.7	42.8	14.5	4.3	1	26.5	9

Table 4. Daily means (±SD) of PM_{10} emission rates at Mt. Victory.

Day	Barn 1				Barn 2							
	Gross Emission Rate				Untreated Gross Emission Rate				Treated Gross Emission Rate			
	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU
	November-04											
1	5.0±3.6	1.2±0.9	30.4±21.4	9.0±6.3	4.1±3.4	1.0±0.8	25.5±20.9	8.7±7.1	2.6±2.0	0.6±0.5	16.0±12.0	5.5±4.1
2	5.0±3.1	1.2±0.7	30.2±18.6	8.9±5.5	4.5±3.5	1.1±0.8	27.8±21.4	9.5±7.3	2.6±1.8	0.6±0.4	15.8±11.3	5.4±3.8
3	3.6±2.8	0.9±0.7	21.7±16.7	6.4±4.9	3.7±3.3	0.9±0.8	22.9±20.2	7.8±6.9	2.4±1.9	0.6±0.5	14.7±11.7	5.0±4.0
4	3.5±1.9	0.8±0.5	21.0±11.4	6.2±3.3	3.5±2.7	0.8±0.6	21.7±16.4	7.4±5.6	2.3±1.6	0.5±0.4	13.9±9.8	4.7±3.3
5	3.7±2.5	0.9±0.6	22.1±15.1	6.5±4.4	3.0±2.7	0.7±0.6	18.7±16.4	6.4±5.6	1.8±1.4	0.4±0.3	11.3±8.8	3.9±3.0
6	3.6±2.0	0.9±0.5	21.6±12.2	6.3±3.6	3.0±2.2	0.7±0.5	18.3±13.6	6.2±4.7	1.8±1.2	0.4±0.3	11.1±7.6	3.8±2.6
7	4.0±2.3	1.0±0.6	24.3±14.0	7.2±4.1	2.7±2.5	0.7±0.6	16.8±15.5	5.7±5.3	1.8±1.5	0.4±0.4	11.2±9.5	3.8±3.2
8	3.6±3.2	0.9±0.8	21.8±19.3	6.5±5.7	2.7±2.5	0.7±0.6	16.7±15.7	5.7±5.4	1.7±1.4	0.4±0.3	10.7±8.7	3.7±3.0
9	-	-	-	-	-	-	-	-	-	-	-	-
10	4.2±3.7	1.0±0.9	25.2±22.1	7.6±6.7	2.3±4.2	0.6±1.0	14.2±26.1	4.8±8.9	1.4±2.0	0.3±0.5	8.8±12.4	3.0±4.2
11	3.6±2.6	0.9±0.6	21.8±15.5	6.6±4.7	2.2±1.4	0.5±0.3	13.3±8.5	4.5±2.9	1.5±0.9	0.4±0.2	9.5±5.6	3.3±1.9
12	3.3±2.7	0.8±0.6	19.8±16.2	6.0±5.0	1.8±1.4	0.4±0.3	11.2±8.5	3.8±2.9	1.3±0.8	0.3±0.2	7.8±5.0	2.7±1.7
13	2.8±2.3	0.7±0.6	16.8±13.9	5.2±4.3	1.6±0.9	0.4±0.2	9.7±5.8	3.3±2.0	1.3±0.7	0.3±0.2	7.8±4.6	2.7±1.6
14	2.8±2.4	0.7±0.6	16.9±14.4	5.2±4.4	1.7±1.2	0.4±0.3	10.7±7.2	3.7±2.4	1.2±0.8	0.3±0.2	7.4±4.6	2.5±1.6
15	3.1±3.6	0.8±0.9	19.1±22.1	5.8±6.7	2.0±1.6	0.5±0.4	12.4±9.7	4.2±3.3	1.2±0.9	0.3±0.2	7.6±5.3	2.6±1.8
16	3.4±2.4	0.8±0.6	20.7±14.7	6.3±4.5	2.1±1.3	0.5±0.3	13.1±7.8	4.4±2.6	1.3±0.7	0.3±0.2	8.0±4.6	2.7±1.6
17	5.1±4.3	1.2±1.0	30.8±26.0	9.4±7.9	2.5±1.9	0.6±0.5	15.6±12.0	5.3±4.0	1.4±1.2	0.3±0.3	8.7±7.5	3.0±2.5
18	4.3±2.7	1.0±0.6	26.3±16.4	8.0±5.0	3.4±2.2	0.8±0.5	21.3±13.8	7.2±4.7	1.7±1.3	0.4±0.3	10.4±8.2	3.5±2.8
19	4.4±3.2	1.0±0.8	26.5±19.5	8.0±5.9	3.2±2.0	0.8±0.5	19.6±12.3	6.6±4.1	1.3±0.8	0.3±0.2	7.8±4.9	2.6±1.7
20	3.7±2.1	0.9±0.5	22.4±12.7	6.8±3.8	3.3±2.0	0.8±0.5	20.4±12.6	6.9±4.2	1.3±0.7	0.3±0.2	7.9±4.4	2.6±1.5
21	3.2±2.2	0.8±0.5	19.4±13.2	5.8±4.0	2.0±1.4	0.5±0.3	12.1±8.7	4.1±2.9	1.2±0.8	0.3±0.2	7.3±5.2	2.5±1.7
22	4.6±3.2	1.1±0.8	27.8±19.7	8.3±5.9	2.3±1.9	0.5±0.5	14.0±11.7	4.7±3.9	1.3±1.0	0.3±0.2	8.0±6.2	2.7±2.1
23	3.6±3.5	0.9±0.8	21.8±21.6	6.5±6.5	2.9±2.0	0.7±0.5	17.8±12.6	6.0±4.2	1.2±0.8	0.3±0.2	7.2±5.0	2.4±1.7
24	3.1±3.5	0.7±0.9	19.0±21.6	5.7±6.5	2.5±2.1	0.6±0.5	15.6±12.9	5.2±4.3	1.1±1.0	0.3±0.2	6.7±6.3	2.2±2.1
25	1.2±1.2	0.3±0.3	7.1±7.4	2.1±2.2	1.8±1.3	0.4±0.3	11.0±8.2	3.7±2.8	1.1±0.7	0.3±0.2	6.6±4.5	2.2±1.5
26	1.9±1.7	0.5±0.4	11.8±10.6	3.5±3.1	1.6±2.0	0.4±0.5	9.9±12.5	3.3±4.2	0.9±1.5	0.2±0.4	5.4±9.0	1.8±3.0
27	2.8±1.9	0.7±0.5	16.9±11.5	5.0±3.4	2.4±2.0	0.6±0.5	14.9±12.5	5.0±4.2	0.9±0.9	0.2±0.2	5.5±5.5	1.8±1.9
28	2.9±2.2	0.7±0.5	17.5±13.3	5.2±4.0	2.1±2.9	0.5±0.7	13.1±17.9	4.4±6.0	0.9±1.3	0.2±0.3	5.5±8.1	1.9±2.7
29	3.0±3.1	0.7±0.7	18.5±19.0	5.6±5.7	1.9±3.3	0.5±0.8	12.1±20.5	4.0±6.9	1.0±1.7	0.3±0.4	6.5±10.7	2.2±3.6
30	3.8±2.6	0.9±0.6	23.1±15.9	7.0±4.8	2.7±3.7	0.6±0.9	16.5±22.8	5.5±7.7	1.2±1.9	0.3±0.4	7.6±11.5	2.6±3.9
Mean	3.5	0.9	21.5	6.4	2.6	0.6	16.1	5.5	1.5	0.4	9	3.1
Std. Dev.	0.9	0.2	5.1	1.5	0.7	0.2	4.6	1.6	0.5	0.1	2.9	1
Min	1.2	0.3	7.1	2.1	1.6	0.4	9.7	3.3	0.9	0.2	5.4	1.8
Max	5.1	1.2	30.8	9.4	4.5	1.1	27.8	9.5	2.6	0.6	16	5.5

Table 4. Daily means (±SD) of PM_{10} emission rates at Mt. Victory.

Day	Barn 1				Barn 2							
	December-04											
	Gross Emission Rate				Untreated Gross Emission Rate				Treated Gross Emission Rate			
	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU
1	3.9±3.9	0.9±0.9	24.2±23.9	7.3±7.2	2.3±4.3	0.6±1.0	14.3±26.8	4.8±9.0	1.2±2.1	0.3±0.5	7.4±13.0	2.5±4.4
2	4.5±3.0	1.1±0.7	27.5±18.2	8.4±5.5	2.2±3.7	0.5±0.9	13.4±22.6	4.5±7.6	1.0±1.6	0.2±0.4	6.2±10.1	2.1±3.4
3	3.6±3.8	0.9±0.9	22.0±23.1	6.7±7.1	2.2±4.3	0.5±1.0	13.4±26.4	4.5±8.9	1.1±1.7	0.3±0.4	6.5±10.7	2.2±3.6
4	3.1±2.6	0.7±0.6	18.8±15.7	5.8±4.8	2.0±5.0	0.5±1.2	12.6±31.0	4.2±10.5	0.9±2.3	0.2±0.5	5.6±13.9	1.9±4.7
5	3.9±3.3	0.9±0.8	24.2±20.5	7.4±6.2	2.1±4.9	0.5±1.2	12.7±30.4	4.3±10.2	0.9±2.5	0.2±0.6	5.3±15.3	1.8±5.2
6	5.9±4.6	1.4±1.1	36.0±28.6	11.0±8.7	2.1±3.1	0.5±0.8	13.0±19.3	4.4±6.5	0.8±1.5	0.2±0.4	4.9±9.3	1.7±3.1
7	6.5±4.0	1.6±1.0	40.0±24.9	12.1±7.5	2.8±2.6	0.7±0.6	17.3±15.8	5.8±5.3	1.1±2.4	0.3±0.6	6.5±14.8	2.2±5.0
8	-	-	-	-	2.1±3.1	0.5±0.7	13.1±19.2	4.4±6.4	0.9±1.3	0.2±0.3	5.6±8.3	1.9±2.8
9	-	-	-	-	2.2±1.3	0.5±0.3	13.3±8.0	4.5±2.7	0.7±0.4	0.2±0.1	4.5±2.6	1.5±0.9
10	-	-	-	-	2.2±1.5	0.5±0.4	13.8±9.2	4.6±3.1	0.8±0.6	0.2±0.1	5.2±3.7	1.8±1.2
11	4.5±3.1	1.1±0.8	28.1±19.4	8.4±5.8	1.8±1.2	0.4±0.3	10.8±7.4	3.6±2.5	0.7±0.5	0.2±0.1	4.6±2.9	1.5±1.0
12	4.0±3.1	0.9±0.7	24.5±19.0	7.3±5.7	1.6±1.1	0.4±0.3	10.2±6.7	3.4±2.3	0.7±0.4	0.2±0.1	4.5±2.8	1.5±0.9
13	4.9±4.4	1.2±1.1	30.1±27.5	9.0±8.2	1.6±1.2	0.4±0.3	9.7±7.6	3.2±2.5	0.8±0.6	0.2±0.1	5.2±3.7	1.7±1.2
14	4.4±3.6	1.1±0.9	27.3±22.0	8.1±6.6	1.3±0.8	0.3±0.2	7.9±4.8	2.6±1.6	0.7±0.4	0.2±0.1	4.2±2.7	1.4±0.9
15	-	-	-	-	1.1±0.7	0.3±0.2	6.9±4.5	2.3±1.5	0.6±0.5	0.1±0.1	3.5±3.1	1.2±1.0
16	-	-	-	-	1.3±0.8	0.3±0.2	8.1±4.9	2.7±1.7	0.9±0.5	0.2±0.1	5.4±2.9	1.8±1.0
17	-	-	-	-	1.3±1.2	0.3±0.3	7.8±7.4	2.6±2.5	0.8±0.6	0.2±0.1	4.9±3.6	1.6±1.2
18	3.0±1.9	0.7±0.5	18.7±11.7	5.5±3.5	1.7±1.3	0.4±0.3	10.5±8.0	3.5±2.7	0.8±0.5	0.2±0.1	5.0±3.1	1.7±1.0
19	2.4±2.0	0.6±0.5	15.0±12.2	4.4±3.6	1.2±1.4	0.3±0.3	7.3±8.9	2.4±3.0	0.6±0.7	0.1±0.2	3.6±4.3	1.2±1.4
20	2.0±1.7	0.5±0.4	12.7±10.7	3.7±3.2	0.6±0.7	0.1±0.2	3.6±4.4	1.2±1.5	-	-	-	-
21	2.5±1.7	0.6±0.4	15.5±10.7	4.6±3.2	1.3±0.9	0.3±0.2	8.3±5.8	2.8±1.9	-	-	-	-
22	2.5±1.7	0.6±0.4	15.7±10.6	4.6±3.1	1.3±1.0	0.3±0.2	8.2±6.3	2.7±2.1	1.1±2.4	0.3±0.6	6.7±15.0	2.2±5.0
23	2.1±0.9	0.5±0.2	13.2±5.8	3.9±1.7	1.3±0.8	0.3±0.2	7.9±4.8	2.7±1.6	1.1±2.3	0.3±0.6	7.0±14.2	2.3±4.7
24	1.3±0.7	0.3±0.2	8.1±4.7	2.4±1.4	0.7±0.4	0.2±0.1	4.1±2.6	1.4±0.9	0.5±2.8	0.1±0.7	3.0±17.3	1.0±5.8
25	1.4±1.1	0.3±0.3	8.8±6.6	2.6±2.0	0.4±0.3	0.1±0.1	2.5±2.0	0.8±0.7	0.3±1.9	0.1±0.4	1.7±11.5	0.6±3.8
26	2.3±1.7	0.6±0.4	14.3±10.8	4.2±3.2	1.3±1.1	0.3±0.3	8.1±6.5	2.7±2.2	0.7±2.4	0.2±0.6	4.1±14.7	1.4±4.9
27	1.7±1.1	0.4±0.3	10.4±6.8	3.1±2.0	1.4±0.8	0.3±0.2	8.5±5.0	2.8±1.6	0.6±0.9	0.1±0.2	3.6±5.8	1.2±1.9
28	2.6±1.7	0.6±0.4	16.1±10.4	4.7±3.1	2.1±1.4	0.5±0.3	13.0±8.9	4.3±2.9	0.6±1.7	0.1±0.4	3.5±10.4	1.2±3.4
29	3.3±1.7	0.8±0.4	20.7±10.7	6.1±3.2	2.6±1.8	0.6±0.4	16.4±11.1	5.4±3.6	1.3±1.2	0.3±0.3	7.8±7.7	2.5±2.5
30	3.5±2.1	0.9±0.5	22.2±13.3	6.5±3.9	3.3±2.0	0.8±0.5	20.6±12.7	6.7±4.1	1.7±1.0	0.4±0.2	10.5±6.1	3.4±2.0
31	4.9±3.2	1.2±0.8	30.6±19.8	9.0±5.8	3.7±2.0	0.9±0.5	23.0±12.3	7.4±4.0	2.1±1.2	0.5±0.3	12.8±7.6	4.2±2.5
Mean	3.4	0.8	21	6.3	1.8	0.4	11	3.7	0.9	0.2	5.5	1.8
Std. Dev.	1.3	0.3	8.2	2.5	0.7	0.2	4.5	1.5	0.3	0.1	2.2	0.7
Min	1.3	0.3	8.1	2.4	0.4	0.1	2.5	0.8	0.3	0.1	1.7	0.6
Max	6.5	1.6	40	12.1	3.7	0.9	23	7.4	2.1	0.5	12.8	4.2

Table 4. Daily means (±SD) of PM_{10} emission rates at Mt. Victory.

Day	January-05											
	Barn 1				Barn 2							
	Gross Emission Rate				Untreated Gross Emission Rate				Treated Gross Emission Rate			
	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU	kg/d	g/d-m^2	mg/d-hen	g/d-AU
1	4.7±2.4	1.1±0.6	29.3±15.0	8.7±4.4	2.9±1.4	0.7±0.3	18.2±8.9	5.9±2.9	1.6±0.7	0.4±0.2	9.8±4.5	3.2±1.4
2	4.8±2.4	1.2±0.6	30.0±15.3	8.9±4.6	2.7±1.9	0.7±0.5	17.0±11.8	5.5±3.8	1.1±0.6	0.3±0.2	6.7±4.0	2.2±1.3
3	5.2±3.6	1.3±0.9	32.7±22.3	9.8±6.7	1.4±1.2	0.3±0.3	8.8±7.4	2.9±2.4	1.0±0.9	0.2±0.2	6.2±5.8	2.0±1.9
4	4.8±2.8	1.1±0.7	29.9±17.8	9.0±5.4	2.2±1.3	0.5±0.3	13.6±8.2	4.4±2.7	1.2±0.7	0.3±0.2	7.5±4.3	2.4±1.4
5	4.6±3.0	1.1±0.7	28.6±19.0	8.7±5.8	2.2±1.4	0.5±0.3	13.5±8.6	4.4±2.8	1.1±0.7	0.3±0.2	6.9±4.5	2.2±1.5
6	4.4±2.5	1.1±0.6	27.5±15.7	8.4±4.8	2.2±1.5	0.5±0.4	13.7±9.2	4.5±3.0	1.0±0.7	0.2±0.2	6.2±4.3	2.0±1.4
7	4.5±3.2	1.1±0.8	28.3±20.0	8.7±6.2	1.7±1.1	0.4±0.3	10.6±6.9	3.5±2.3	0.9±0.7	0.2±0.2	5.6±4.2	1.8±1.4
8	4.7±3.1	1.1±0.8	29.9±19.8	9.2±6.1	1.9±1.5	0.5±0.4	11.9±9.4	3.9±3.1	1.2±0.8	0.3±0.2	7.4±5.2	2.4±1.7
9	4.1±2.4	1.0±0.6	26.2±15.1	8.0±4.6	2.0±1.7	0.5±0.4	12.8±10.7	4.2±3.5	1.2±0.8	0.3±0.2	7.2±5.2	2.4±1.7
10	4.5±2.9	1.1±0.7	28.8±18.6	8.8±5.7	2.9±2.2	0.7±0.5	18.1±13.9	5.9±4.5	1.5±1.0	0.4±0.2	9.2±6.0	3.0±2.0
11	4.4±2.4	1.1±0.6	28.2±15.2	8.6±4.6	3.1±2.0	0.8±0.5	19.5±12.4	6.4±4.0	1.3±0.7	0.3±0.2	8.0±4.3	2.6±1.4
12	5.4±3.3	1.3±0.8	34.6±21.2	10.5±6.4	3.5±2.3	0.8±0.5	21.7±14.1	7.1±4.6	1.4±0.7	0.3±0.2	8.6±4.5	2.8±1.5
13	4.1±3.1	1.0±0.7	25.9±19.5	7.8±5.9	3.5±2.3	0.8±0.6	21.8±14.5	7.1±4.7	1.4±1.5	0.3±0.4	8.6±9.7	2.8±3.2
14	3.9±4.0	0.9±1.0	24.7±25.3	7.4±7.6	1.5±1.1	0.4±0.3	9.5±7.1	3.1±2.3	1.1±0.9	0.3±0.2	6.9±5.5	2.3±1.8
15	3.6±2.6	0.9±0.6	22.6±16.2	6.9±4.9	1.4±1.0	0.3±0.2	8.5±6.0	2.8±1.9	0.9±0.9	0.2±0.2	5.6±5.6	1.8±1.8
16	3.6±2.8	0.9±0.7	23.2±17.7	7.1±5.4	1.2±0.8	0.3±0.2	7.4±5.0	2.4±1.6	1.0±0.9	0.2±0.2	6.1±5.9	2.0±1.9
17	2.8±2.1	0.7±0.5	17.9±13.7	5.6±4.3	-	-	-	-	-	-	-	-
18	1.8±1.6	0.4±0.4	11.7±9.9	3.7±3.1	-	-	-	-	-	-	-	-
19	4.1±3.4	1.0±0.8	25.9±21.5	8.3±6.9	-	-	-	-	-	-	-	-
20	4.0±2.8	1.0±0.7	25.8±17.8	8.4±5.8	-	-	-	-	-	-	-	-
21	2.8±2.0	0.7±0.5	18.2±12.5	6.0±4.1	-	-	-	-	-	-	-	-
22	3.3±2.4	0.8±0.6	21.3±15.1	7.1±5.0	-	-	-	-	-	-	-	-
23	2.6±2.8	0.6±0.7	16.9±17.8	5.7±6.0	-	-	-	-	-	-	-	-
24	2.2±3.5	0.5±0.8	14.1±22.5	4.8±7.8	-	-	-	-	-	-	-	-
25	4.0±2.7	1.0±0.7	25.7±17.6	8.9±6.1	-	-	-	-	-	-	-	-
26	4.0±3.1	1.0±0.7	26.0±20.1	9.2±7.1	-	-	-	-	-	-	-	-
27	2.6±2.3	0.6±0.5	17.1±14.6	6.1±5.2	-	-	-	-	-	-	-	-
28	3.5±3.5	0.8±0.9	22.4±23.0	8.2±8.4	-	-	-	-	-	-	-	-
29	4.6±3.6	1.1±0.9	29.6±23.4	10.9±8.6	-	-	-	-	-	-	-	-
30	4.0±3.0	1.0±0.7	26.0±19.7	9.6±7.3	-	-	-	-	-	-	-	-
31	3.5±2.9	0.8±0.7	22.5±19.0	8.4±7.1	-	-	-	-	-	-	-	-
Mean	3.9	0.9	24.9	8	2.3	0.5	14.2	4.6	1.2	0.3	7.3	2.4
Std. Dev.	0.9	0.2	5.3	1.6	0.7	0.2	4.6	1.5	0.2	0.0	1.2	0.4
Min	1.8	0.4	11.7	3.7	1.2	0.3	7.4	2.4	0.9	0.2	5.6	1.8
Max	5.4	1.3	34.6	10.9	3.5	0.8	21.8	7.1	1.6	0.4	9.8	3.2

KMK | Keating Muething & Klekamp PLL
ATTORNEYS AT LAW

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May 12, 2005
Via E-Mail
Ms. Mary T. McAuliffe
Associate Regional Counsel
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
Re:
Stipulated Penalty Demand, U.S. v. Buckeye Egg Farm L.P., et al, Civil Action 3:03 CV 7681
Dear Ms. McAuliffe:
This letter serves to briefly respond to the United States Environmental Protection Agency's request that Ohio Fresh Eggs specify what factual matters or stipulated penalty calculations set forth in EPA's Stipulated Penalties Demand letter of April 21, 2005 are disputed. Ohio Fresh Eggs disputes the following factual matters and stipulated penalty calculations, and reserves the right to dispute other matters identified in EPA's Demand Letter during the dispute resolution period provided by the Consent Decree.
Facts Disputed
1. Croton Preliminary Test Results submitted late.
2. Croton PM Control Plan Revisions submitted late.
3. Croton PM Silsoe Test late.
4. Mt. Victory PM Preliminary Test Results submitted late.
5. Mt. Victory Monthly PM Silsoe Test Data submitted late.
6. Mt. Victory Ammonia Control Plan submitted late.
7. Mt. Victory Ammonia Bench Scale Results submitted late.
8. Mt. Victory Ammonia Silsoe Test late.
9. Mt. Victory Monthly Ammonia Test Data submitted late.

Penalty Calculations Disputed
1. Preliminary Test Results
2. Method 17 Testing
3. Method 17 Test Results
4. Croton PM Control Plan Revisions
5. Croton Silsoe Testing
6. Croton Barn Conversion

7. Ammonia Control Plan
8. Bench Scale Test Results
9. Mt. Victory Ammonia Control Plan Revisions
10. Mt. Victory Ammonia Silsoe Testing
11. Mt. Victory Monthly Data Submissions

Additional explanations concerning these disputed matters will be provided during our informal dispute resolution meeting on May 12, 2005.

Sincerely,

KEATING MUETHING & KLEKAMP PLL

Brian M. Babb

By:
Brian M. Babb

cc: Mr. Donald C. Hershey
Mr. Richard L. Campbell
Dr. Albert J. Heber

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May 12, 2005

Via E-Mail

Ms. Mary T. McAuliffe
Associate Regional Counsel
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Re:
Stipulated Penalty Demand, U.S. v. Buckeye Egg Farm L.P., et al, Civil Action 3:03 CV 7681

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Facts Disputed

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4. Mt. Victory PM Preliminary Test Results submitted late.
5. Mt. Victory Monthly PM Silsoe Test Data submitted late.
6. Mt. Victory Ammonia Control Plan submitted late.
7. Mt. Victory Ammonia Bench Scale Results submitted late.
8. Mt. Victory Ammonia Silsoe Test late.
9. Mt. Victory Monthly Ammonia Test Data submitted late.

Penalty Calculations Disputed

1. Preliminary Test Results
2. Method 17 Testing
3. Method 17 Test Results
4. Croton PM Control Plan Revisions
5. Croton Silsoe Testing
6. Croton Barn Conversion

7.Ammonia Control Plan
8.Bench Scale Test Results
9.Mt. Victory Ammonia Control Plan Revisions
10. Mt. Victory Ammonia Silsoe Testing
11. Mt. Victory Monthly Data Submissions

Additional explanations concerning these disputed matters will be provided during our informal dispute resolution meeting on May 12, 2005.

Sincerely,

KEATING MUETHING & KLEKAMP PLL

Brian M. Babb

By:
Brian M. Babb

cc: Mr. Donald C. Hershey
Mr. Richard L. Campbell
Dr. Albert J. Heber

1444472.1

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April 5, 2005

Via UPS
Attention: Compliance Tracker, AE-17J
Air Enforcement and Compliance Assurance
Branch
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604

Re: Ohio Fresh Eggs, LLC – U.S. EPA Request For Information

Dear Sir/Madam:

This letter is being submitted on behalf of Ohio Fresh Eggs, LLC in response to the United States Environmental Protection Agency's (EPA) March 24, 2005 Request For Information pursuant to Section 114 of the Clean Air Act (copy attached), which was received on or about March 28, 2005. EPA sought the following information from Ohio Fresh Eggs.

APPENDIX B

Ohio Fresh Eggs must submit responses to the following questions within seven days after receipt of this 114 Request for Information.

1. Ohio Fresh Eggs indicated in its January 26, 2005 Quarterly Report that the mineral feed additive from Rose Acre is being used at barn 2 at the Mt. Victory Facility, beginning on December 1, 2004.

   a. Is the feed additive still being used?

   OFE Response.

   No. The current supply of the additive at the site has been expended. Use of the feed additive (called Eco-Cal) provided by Rose Acre Farms, Inc. to Ohio Fresh Eggs under a Use and Confidentiality Agreement for testing purposes began on or about December 3, 2004. The feed additive was used in Barn No. 2 at the Mt. Victory Facility from December 3, 2004 to about January 15, 2005, and then from February 15, 2005 to March 28, 2005. Use of the feed additive for testing purposes was suspended to change out the layer chickens in Barn No. 1, to clean out the manure in Barn No. 2, to enable Ohio Fresh Eggs to evaluate the effectiveness of the PM and ammonia controls at the Mt. Victory Facility and to conduct an evaluation of which PM controls will be further tested.

b. Is the Secondary Method testing in accordance with Ohio Fresh Eggs' Revised Ammonia Emissions Control Design and Implementation Plan (approved October 12, 2004) still on-going?

OFE Response.

No. The Secondary Method or Silsoe Testing of the impact of the feed additive on ammonia emissions from Barn No. 2, under EPA's October 13, 2004 approval, was suspended upon the completion of the PM control Silsoe Testing in Barn No. 2 on February 1, 2005, and for the reasons stated above. Dr. Heber has continued to collect ammonia data at Barn No. 2 at the Mt. Victory Facility, however, manure removal operations recently damaged several sampling lines.

2. If the feed additive is no longer being used at Mount Victory barn 2, provide the dates that the feed additive was terminated.

OFE Response:

Use of the feed additive in Barn No. 2 at the Mt. Victory Facility was suspended from about January 15, 2005 to February 15, 2005, due to feed mixup by Ohio Fresh Eggs' site personnel and on March 28, 2005 due to depletion of onsite supplies of the feed additive.

3. If the Secondary Testing is no longer being conducted at Mount Victory barn 2, provide the dates that the Secondary Testing was terminated.

OFE Response:

Secondary testing of PM and ammonia controls at Barn Nos. 1 and 2 at the Mt. Victory Facility ended on February 1, 2005, when the 6-month Secondary Method or Silsoe Testing for PM control was completed.

4. What is the status of preliminary testing and/or implementation of the particulate matter (PM) control technologies at Ohio Fresh Eggs' Croton Facility? The proposed PM control technologies were submitted electronically, for U.S. EPA review, on February 1, 2005 as an addendum to Ohio Fresh Eggs' October, 2004 PM Control Plan. U.S. EPA approved the proposed PM control technologies in a letter dated February 18, 2005.

OFE Response:

Ohio Fresh Eggs is engaged in ongoing review and discussion with vendors, consultants, and its own staff regarding those PM control technologies that have been approved by EPA, and is evaluating other possible PM controls. Ohio Fresh Eggs installed a water impingement collection device on an exhaust fan discharge enclosure in Barn No. 4 at Layer Site 1 at the Croton Facilities on March 18, 2005, and has been informally evaluating its effectiveness before proceeding with formal testing. Ohio Fresh Eggs is engaged in discussions with the manufacturer concerning the installation of the Biocurtain, and is continuing to evaluate testing of the Biocurtain and the water impingement device, and the concerns raised in EPA's February 18, 2005 approval letter. Ohio Fresh Eggs has received additional information from the manufacturer of the Biocurtain with Electrostatic Space Charging System, and a proposal from Dr. Heber for further testing of PM and ammonia controls.

Ohio Fresh Eggs continues to evaluate these PM controls and alternative controls to determine which controls are likely to be effective in reducing emissions and in being economically feasible to use before expending significant additional resources to test such controls.

CERTIFICATION

I certify under penalty of law that I have examined and am familiar with the information in the enclosed documents, including all attachments. Based upon my inquiry of those individuals with primary responsibility for obtaining the information I certify that the statements and information are to the best of my knowledge and belief, true and complete. I am aware that there are significant penalties for knowingly submitting false statements and information, including the possibility of fines or imprisonment pursuant to Section 113 (c)(2) of the Act, and 18 U.S.C. §§ 1001 and 1341.

I hope you find this information responsive to EPA's Request For Information. Should you have questions or need additional information, please contact me.

Very truly yours,

KEATING MUETHING & KLEKAMP PLL

By: Brian Babb
Brian M. Babb

cc: Ms. Sandra Howland
Mr. Joseph Koncelik
Mr. Cary Secrest
Ms. Deborah Reyher
Mr. Fred Dailey
Mr. Donald Hershey
Mr. Rick Campbell
Dr. Al Heber

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